

SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, JANUARY 8, 1904.

CONTENTS:

<i>Convocation Week</i>	41
<i>Some Recent Phases of the Labor Problem:</i> H. T. NEWCOMB.....	46
<i>The Association of American Agricultural Colleges and Experiment Stations:</i> DR. E. W. ALLEN	61
<i>Scientific Books:—</i>	
<i>Traquair on the Lower Devonian Fishes of Gemünden:</i> PROFESSOR BASHFORD DEAN. <i>Theobald's Report on Economic Zoology:</i> F. H. CHITTENDEN. <i>The International Catalogue of Scientific Literature—Geology:</i> F. B. WEEKS.....	64
<i>Scientific Journals and Articles</i>	67
<i>Societies and Academies:—</i>	
<i>The North Carolina Section of the American Chemical Society:</i> C. D. HARRIS. <i>New York Section:</i> DR. H. C. SHERMAN. <i>The Chemical Society of Washington:</i> DR. A. SEIDELL. <i>The Biological Society of Washington:</i> F. A. LUCAS. <i>The Anthropological Society of Washington:</i> DR. WALTER HOUGH. <i>The Botanical Society of Washington:</i> DR. HERBERT J. WEBBER. <i>The Torrey Botanical Club:</i> DR. F. S. EARLE. <i>The Research Club of the University of Michigan:</i> PROFESSOR FREDERICK C. NEWCOMB	67
<i>Discussion and Correspondence:—</i>	
<i>Morgan on Evolution and Adaptation:</i> DR. J. T. CUNNINGHAM. <i>Mutation and Selection:</i> DR. MAYNARD M. METCALF. <i>Wilbur Wright's Successful Flight in a Motor-driven Aeroplane:</i> H. H. CLAYTON.....	74
<i>The Editorial Committee of Science</i>	77
<i>Scientific Notes and News</i>	77
<i>University and Educational News</i>	80

MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

CONVOCATION WEEK.

The second of the convocation week meetings of scientific and learned societies leaves no doubt as to the wisdom of the general plan, though it is evident that a final solution can only be reached by gradual evolution. The meetings held at St. Louis, Philadelphia, Pittsburg, Princeton and elsewhere brought together large groups of scientific men, and the programs of papers and other features, both formal and informal, were satisfactory and profitable. With the exception of the first of the convocation week meetings held last winter at Washington, when practically all the scientific societies met together, so many scientific men have not simultaneously attended the meetings of their societies. Last winter there was some friction in the relations of the numerous societies meeting together for the first time and partly confluent in their scope; but such friction naturally leads to attrition and adjustment. When individuals or societies are isolated there are always excrescences in process of formation, which require friction for their removal.

We can not, consequently, regard the meetings this year as wholly satisfactory. The attendance of the meeting of the American Association and its affiliated societies at St. Louis was not as large as had been expected. It seems unfortunate that

the American Society of Naturalists should have met at a different place from many of the national societies devoted to the biological sciences which have usually been affiliated with it; that the newly formed Paleontological Society should have met apart from the Geological Society; that the psychologists should have met at St. Louis and the philosophers at Princeton; the mathematicians of the central states at St. Louis and those of the eastern states in New York, and the like. The vast area of the country makes sectional meetings inevitable, but it can scarcely be assumed that the arrangements this year were the best possible.

This journal has consistently advocated a convocation week meeting of our national societies, in which all shall be represented, if not by sessions and programs, then by delegates. One of the most important problems of the present decade is the proper affiliation of men of science to promote their interests, which we sincerely believe represent the interests of civilization. Combinations of labor and of capital may be purely selfish, promoting the interests of one class at the expense of another, though there is good reason to hope that in the end trades unions and corporations will benefit the whole community; but from the very outset every advance in science is for the benefit of all. Faraday and Henry investigated the phenomena of electromagnetism in the laboratory; others joined in the work and gave us the telegraph, the telephone, the electric motor and the rest, adding billions of dollars to the wealth of the world. The direct and indirect work of a single man,

such as Liebig or Pasteur, adds more to the common wealth than all the scientific men that have ever lived have drawn from it. The material contributions of science are obvious and trite; but it is sometimes not fully realized that the social and intellectual results are even greater. All our mental, social and esthetic ideals have become clarified. Great men lived before the dawn of modern science, greater perhaps than any now living, but their activity was often fragmentary, and in many directions childish. The doctrine of evolution and other scientific concepts are now the common heritage of every one, guiding all thought and all action.

It is entirely reasonable to urge that whatever advances science must benefit every one; first perhaps an individual, but then a class, a country and the world. This truth must be impressed on the whole people; and it must be done by those who realize it most fully, that is by scientific men themselves. Much progress has indeed been made in this country. The national government does more for scientific work than any other; the states and municipalities do more; private gifts to universities and scientific institutions are larger, far larger, than elsewhere. But this is a matter of the last twenty years; we have only begun. The United States must assume the leadership in science, not only for its own advantage, but also for the welfare of civilization.

Our press, the pulpit, legislative bodies, public sentiment generally, are well meaning, but excessively crude. Scientific men have a large problem in education before

them, and it must be admitted that education must begin at home. All dissensions and petty quarrels are harmful. There is too much rivalry and too little cooperation in scientific work. We inherit from a long past certain competitive tendencies which should become obsolete. The attainment of priority, degrees, honors, membership in exclusive societies, and the like, have been largely the rewards of scientific men. Better no heaven than one with a limited seating capacity, for which each strives to the exclusion of others. It is less selfish to seek wealth by producing new wealth which is shared by all, than to attempt to secure honors at the cost of depreciating others.

The moral intended is, of course, that scientific men should unite to promote their common interests. A single individual should subordinate his interests to those of the group, and a single society to those of the general organization of societies. It is fortunately the case that the interests of the individual usually coincide with those of the group; the conflict is more often between the temporary and permanent interests of an individual or of a group. The theory of evolution tells us that this conflict is due to maladjustment, the environment having changed more rapidly than the individual or the group has been able to adjust itself to it.

This appears to be the case just now in the organization of science. Scientific workers have increased fivefold in from ten to twenty years; new and specialized lines of scientific work have arisen; the geographical center of scientific population and interest is moving from the eastern

seaboard toward the west. The organization that sufficed twenty years ago is no longer adequate. Special societies for each science have arisen and regional and local sections have been formed. Organic fusion must be slow, but better progress can be made by intelligent guidance than by submission to the wasteful processes of natural selection. No one can lay out a valid program for the future, but suggestions can be made subject to the survival of the fit, among which the waste by failure is less than in the case of experience by the rule of thumb.

The Smithsonian Institution, the National Academy of Sciences and the Carnegie Institution, each has had an opportunity to become the center of scientific organization for the country, and each has completely failed. This is not altogether regrettable. We live in a democratic age and community; government by representation is better than any aristocratic or despotic form, however benevolent. The organization of the council of the American Association adapts it for becoming the chief center for scientific organization. The association represents the entire country and all the sciences. If any regions are inadequately represented in its membership or any sciences are not included in its scope, this need not continue to be the case. The council is not only the representative body of the association, but also of all scientific societies that wish to be represented on it. It is not known to every one that any scientific society may by vote of the council become affiliated with the association. In this case it sends one or two delegates, accord-

ing to its size, to the council, and has the option of meeting with the association; its members, even when not members of the association, enjoy all the privileges of reduced rate of transportation, provision of place of meeting, entertainments, etc., provided by the association. At the same time the society retains its complete autonomy. It can meet when and where it likes, and if it meets with the association its scientific program and other functions remain entirely under its own control. The association has been liberal and catholic in its treatment of affiliated societies. For example, at the meeting last week the Society of College Teachers of Education and the Society for Horticultural Science were admitted to affiliation. Some societies, as the American Chemical Society and the American Physical Society, met at St. Louis in conjunction with the corresponding sections of the association; others, as the Geological Society of America and the American Botanical Society, provided independent programs. No society that has met several times with the association has shown any disposition to separate itself from it. Different societies may hold independent meetings in summer or even in convocation week, but they will not break an affiliation that has proved useful for the society, for the association and for the general progress of science. If any society is unwilling to become affiliated with the association, it is probably due to ignorance of the conditions.

The American Association, the American Society of Naturalists and about twenty affiliated societies, including all

those devoted to the physical sciences and many of those devoted to the natural sciences, met together at St. Louis. It was believed by many members of the council that it was undesirable to select St. Louis as the place of meeting this winter. The council has in recent years recommended a place of meeting two years in advance. When the meeting at St. Louis was first discussed at Denver, it was supposed that it would be last summer in connection with the exposition. The exposition was postponed for a year, and the association changed its time of meeting to the winter. It would probably have been wiser for the association to have continued its summer meetings, at least until the relative advantages of winter and summer meetings had become evident. If the association and such of the affiliated societies as had wished had met last summer at Ithaca, this winter at Philadelphia and next summer at St. Louis in conjunction with the Congress of Arts and Science, the conditions would have been more satisfactory than is the case at present. But at Washington the council of the association had no definite knowledge of the congress of the exposition, the chemists had met at Philadelphia the year before, and no one could have supposed that the eastern branch of the Zoological Society and other biological societies would have met at Philadelphia, when it was known that the association would meet there next year. Scientific societies, like national governments, have a way of muddling through; but it is surely reasonable to suppose that men of science should be the first to

apply scientific methods to their own guidance.

The American Association and a majority of our scientific societies will meet next year at Philadelphia and the following year at New Orleans. Other societies should adjust their plans to this definite program. It may be desirable for the naturalists of the central states to hold a meeting of their own next year and for the naturalists of the eastern states to hold a separate meeting the following year, and individual societies may like to meet sometimes apart from the general meeting. But it would be unfortunate to have two competing groups of naturalists meeting next year at the same time and in the same region. If this should occur, it would not be the result of the wishes of the general body of naturalists, but through misunderstandings on the part of a few officers. If any of the societies that met at Philadelphia last week are unwilling to return next year, or wish to hold meetings apart from the main group, it is to be hoped that they will meet separately in small university towns, rather than undertake to organize a conflicting group.

It would be desirable for the council of the American Association, representing the association and affiliated societies, to lay out its program even more than two years in advance, it being of course always adjustable to new conditions. There appears to be no valid argument against both summer and winter meetings. It entails extra labor on the secretaries, but they should be adequately paid, and different summer and winter secretaries could be

elected should this prove desirable. The council of the association should and does meet twice a year, and it appears that a summer meeting would be a better occasion than the time of the meeting of the National Academy at Washington. A summer meeting, supposing waste on printing programs and the like to be eliminated, would increase the receipts more than the expenditures; in any case the association has an ample income, having been able in recent years to turn over large sums from the income to the permanent funds. Since the New York meeting of the association, when it was decided to send *SCIENCE* free of charge to all members, the membership has increased from 1,700 to over 4,000. If seventeen hundred members—there were actually but twelve hundred who were in full standing—could hold one meeting annually, four thousand members can hold two. It is nearly always a mistake for those who do not want to do a thing to say to those who do: You must not. With the exception of certain officers, most of whom might be elected in duplicate, no one need attend any particular meeting of the association. If the work were somewhat differentiated there would be ample room for two meetings a year, with a satisfactory attendance and program at each.

We look forward to seeing the convocation week meeting in midwinter the great assemblage of American men of science, where all societies will be represented either by a plebiscite or by delegates, which will impress on the public at large the weight and magnitude of scientific work. The

meeting should be essentially an affiliation of scientific societies, but they should when convenient confine their special programs to the mornings, leaving the afternoons to the sections of the association, two or three of which should arrange for each afternoon programs of general interest to scientific men, uniting in many cases the common fields of several sciences. This convocation week meeting must be held in a large city and its work must be largely technical. But there appears to be ample room for smaller and less formal meetings in the summer, held in a university town or summer resort, where those who liked—and many teachers and others whose work in science is somewhat that of the amateur would appreciate the opportunity—could come together. Out-of-door life and scientific excursions would there be possible, pleasant and profitable.

A full discussion of the whole problem of scientific organization would be opportune and useful at the present time. This journal will be glad to give space to those who are willing to express their views on the subject, and we hope that it will be discussed from different standpoints.

*SOME RECENT PHASES OF THE LABOR PROBLEM.**

OLD PROBLEMS, BUT NEW CONDITIONS.

IN the rapid development of modern industry old problems are ever assuming new and perplexing phases, but intrinsically new ones rarely develop. Each age is quick to imagine that its difficulties exceed those which were conquered by its predecessors, and to fancy the latter as free

* Address by the vice-president and chairman of Section I, Economics and Social Science, St. Louis meeting, December, 1903.

from the obstacles in overcoming which the courage and genius of its own leaders are subjected to their supremest tests. But this is the superficial view only. Just as the principle upon which the most complex mechanism performs its marvelously specialized functions is to be found in the crudest labor-saving devices of the earliest dawn of culture, so the most primitive industrial organization, when subjected to minute scrutiny, is sure to present traces of those elements of friction, which, one after another in different stages of progress, become the particular and absorbing problems of generations to which each in turn seems the sole serious impediment to the realization of perfect conditions.

The labor problem is no exception. It is the struggle between different factors in production over the relative shares of each, and its origin lies deep in fundamental conditions which have existed as long as men have known the wisdom of saving labor by the use of tools and of conserving productive resources by the device of private property. It will persist, in one or another of its protean forms, until by some unlooked-for alchemy man learns to satisfy all human wants without requiring from any individual more labor or abstinence than he will voluntarily undertake. In every historic era this unceasing struggle has left indelible traces upon the record of man's progress, and rarely has it yielded the place of primary importance in the minds of men to anything less compelling than religious zeal.

A PERSISTENT INQUIRY.

How shall the comfort of satisfied economic wants be divided between those who contemporaneously endure the physical discomforts of toil and those who control the other factors in production? This is the everlasting question which, in various forms, has been asked and answered, re-

asked and answered again in unending repetition while humanity has struggled from the crudest forms of industrial organization, through slavery and serfdom, up to the wages system. It is asked to-day, when the share of the poorest who labors with his hands is sufficient to purchase comforts which a few centuries ago were beyond the reach of kings, and although the agencies which capital has established seek daily in the uttermost limits of the earth and among the most distant islands of the sea to bring thence and lay cheaply at the feet of labor every product that can satisfy or please, the final answer is not yet. Indeed, in this most fortunate land, where sturdy manhood has found nature in her most generous mood and industry and genius have won an abundant and increasing harvest, there is at this hour of highest prosperity a reverberating discontent which seems to some to menace much that has been gained.

The organized demand for a better answer to this persistent questioning than labor has ever yet received appeals strongly to the sympathies of those who love their fellowmen, and, as long as it is kept within reasonable bounds by a due sense of the responsibilities of strength and the rights of others, will have the aid and approval of the right-minded. But sympathy may go where sanction must be denied, and in every step of its perpetual struggle for what it rightly or wrongly conceives to be the interests of labor, and the means of attaining a higher standard of comfort and culture, the demands of organized labor must be subjected to intelligent scrutiny, and the probable consequences of granting them must be calmly and minutely examined.

CONDITIONS OF THE PROBLEM OF DISTRIBUTION.

Let us enumerate a few of the funda-

mental conditions of this struggle over distribution. Capital is the great labor-saving contrivance and the mother of all labor-saving devices. Withdraw that which exists, and, with the most grinding toil, the earth could not be made to support a tithe of its present population. Stop its further accumulation, and industrial progress would cease until presently it should give place to retrogression. Remove the incentive to abstinence, and saving and accumulation would stop, while the gradual consumption of existing capital, not offset by replacement, would inaugurate a movement toward barbarism. Reduce the incentive, and the pace of progress will be proportionately slackened. But capital is not only the handmaiden of labor; it is the accumulated product of labor. Wherever it exists, it is conclusive evidence of previous effort and abstinence. Labor, alone, can pluck the ripened fruit; it can not increase the product by cultivation, for it can not subsist during the period of growth. Labor can wade in the stream and catch a few fish with its naked hands, but it can not spread the net to gather food for a multitude unless capital provides for its immediate necessities while the fabric is being constructed. Labor can carry an armful of coal or a stick of lumber, but the locomotive which hauls its train of fifty cars, each containing one hundred thousand pounds of coal or lumber, is capital. But the instruments of husbandry, the net, the locomotive, have no direct or final utility of their own. Of themselves, they neither feed, nor clothe, nor house the body of man, nor minister to his higher needs. They will not be brought into being, unless, for the effort expended in their creation, their producers are guaranteed a fitting recompense. This recompense must be a share in the products obtained through their agency and the economic name for this share is 'interest.'

Interest, including in that term compensation for the risk assumed, is all that capital, as such, ever obtains from production; it is the least which it will accept. It is high when the supply of capital is small in proportion to the demand for it, and low when the condition is reversed. Profit is not for capital; it is the wages of the usually arduous labor of determining the direction of industrial investments or the differential reward of exceptional economic foresight or technical skill. Those who reap profits are differentiated from those who receive wages by the fact that profits are dependent upon success (possibly it is better to consider that in the case of failure there are really negative profits), while wages constitute a preferred claim, the payment of which is usually arranged for in advance.

THE LIMIT OF WAGES.

Here, then, are the conditions of the problem. Labor must have its wages at all times and under all conditions. In the long run directing efficiency must have its profits and capital must have its interest. Wages may often absorb portions of the shares of the other claimants, but unless these are eventually satisfied, the efficiency of industry will be impaired and capital will cease to accumulate, either because the owners of wealth prefer to consume it or because they hoard it rather than permit its use as capital on unsatisfactory terms. Thus is the limit of wages fixed. The efforts of organized workingmen to secure higher wages deserve approval so long as they do not threaten industrial efficiency through a reduction of interest or profits below the minimum limits respectively fixed by marginal capitalists and *entrepreneurs*. Demands that exceed these limits would, if granted, produce results which could only react unfavorably upon those who made them. The increase and

progressive diffusion of industrial intelligence tend to reduce the amounts which can be effectively demanded by those whose service to society lies in determining the character and organization of productive efforts, and the rapid accumulation of capital tends to reduce the general rate of interest. Consequently, wage-earners can reasonably anticipate an increasing share of the value annually produced, and if, under favorable conditions, they fail to receive it they may justly demand a change in the proportion which they are accorded.

WHY WORKMEN ORGANIZE.

The instinct which impels workingmen to organize rather than to deal separately with their employers is precisely the same as that which at other points of economic contact has universally led to efforts to mitigate the consequences of competition by the simple device of combination. The single workman, dealing with an employer of many workmen engaged to render similar service, is at exactly the same sort of disadvantage which confronts the small manufacturer who has to sell in a market to which a multitude of competing producers have access on equal terms. There is nothing strange in the fact that the characteristic movement of the great industrial revolution which has been in progress since the invention of the spinning jenny and the power loom has left its impress upon labor as well as upon capital. If labor had not organized, it would have been a sadly belated factor in the industry of the opening years of the twentieth century. Just as capital must continue to compete with capital, so labor will compete with labor as long as capitalistic production and the wages system endure, but on either side folly could go no further than to seek the perpetuation of the crude, cut-throat competition which seeks the immediate exter-

mination of the rival at whatever cost to the survivor. Such competition is crude in its methods; it is destructive in its consequences, and it is not, to-day, a means of attaining the highest degree of economic efficiency. Both capital and labor are amply justified in uniting to mitigate this kind of competition. It is to be observed, in passing, that the capitalistic combination, when fully justifiable, is the means of economies in operation and management which lower the cost of production, and in the face of actual or potential competition are always finally expressed in reduced prices. The labor combination has so far almost always lacked this justification, and the leaders must systematically seek it or their organizations must continue to find their entire economic basis in the mitigation of the evils of unrestrained and destructive competition.

THE EMPLOYERS' SIDE.

Enlightened employers do not expect or desire to obtain profits by securing the greatest aggregate of labor, measured in hours or effort, at the lowest cost. The American manufacturer has seen the greatest productive efficiency coincide with the highest wages, and he knows that the countries where workmen receive the lowest real wages are unable to compete in the markets of the world with those whose labor is better paid. He is able to estimate somewhat accurately the superiority of intelligent, well-fed, well-clothed, well-housed and contented workmen over those who do not enjoy similar advantages. He knows that every machine in his factory works better in the hands of those whose standard of living requires a high degree of comfort. Yet in the economic philosophy of American employers there is no place, and there should be none, for gratuities. High wages, liberal wages, are preferred not from any impulse of gener-

osity, which would be out of place and destructive of its own purposes, but because, dollar for dollar, the return from high wages exceeds that from low wages. When this is not the case, it means that the point of over-payment has been reached. The excess of the wages received by the overpaid group, in such an instance, over the normal amount, is a burden which must be borne by the other industries and the other workmen of the same community. Each workman must give in labor a fair equivalent for what he receives in wages, or some other workman will receive less than he gives. The employer who, for the sake of continued peace during a period of high profits or for any other reason, aids in establishing such a condition, strikes a blow at industrial welfare which in the end will fall most severely upon the wage earners. It is not claimed that the practices of individual employers invariably attain to these standards. Narrow selfishness and unenlightened greed sway their proportions of the members of every industry and every grade in every industry. Employers have dealt grudgingly and even cruelly with workmen in far too many instances and always to their own injury. Yet the conditions which make for fair dealing are so compelling, even if we omit the paramount condition created by the force of public sentiment, and they are so easily read, that it is not too much to say that, in the main, American employers desire to deal fairly, and do deal fairly with the men whose names are upon their pay-rolls.

HOW IT LOOKS TO UNIONISTS.

The economic philosophy of general acceptance among the members of labor organizations is not so easily grasped. Indeed, there is reason to believe that, except for a few generalizations of the broadest character, there is no economic creed to

which American trade unionists as a class adhere. Among their leaders, there is every shade of belief from the strong individualism of John Mitchell to the socialism of Eugene Debs. Even in the principles to which the various unions of the American Federation of Labor adhere, there is no uniformity, for we find organizations, like the United Mine Workers, which desire a monopoly of all labor engaged in certain kinds of production and move toward it by waging destructive warfare upon existing unions of more modest ambitions, side by side with others which admit only the journeymen workers of single highly specialized trades. Theoretical agreement is probably confined to the propositions that the share of labor in the products of current industry should steadily increase at the expense of the share of capital, and that this can be accomplished by the enforcement of collective bargaining. It is less surprising that the first proposition should be pressed by some to the extreme of denying the validity of the claim of capital to even the smallest share in the benefits following production than it is gratifying that the socialists, whose philosophical system rests upon this view, have made so little progress in their efforts to turn the labor movement into an organized demand for the socialization of all industry.

DIVERGENT UNION METHODS.

Even in the current practices of unionism there is little uniformity. At their best, as exemplified in the recent history of some of the brotherhoods of railway employees, these practices tend to increase the dignity of labor and to simplify the relations between employers of large bodies of labor and the workingmen composing the latter. On the other hand, there have been instances in every great city and in most industries in which organized labor has been

made the means of denying to American citizens some of the most fundamental rights of industrial liberty; of intolerable interference with public order, and of oppression, falling with equal injustice upon representatives of capital and of labor. What more significant contrast could there be than that offered by American unionism; one day paying tribute at the grave of P. M. Arthur, the conservative leader of a conservative organization, and, on another, parading under the leadership of a creature under conviction for using his position in a labor union as a means of blackmail and the grotesque figure of the man whose infamous name has become a synonym for the unspeakable vileness of the lowest period in the political degradation of the chief city of this country. Yet how short the interval between the funeral of the late Grand Chief of the Brotherhood of Locomotive Engineers and the Labor Day parade led by Parks and Devery.

CONDUCT THE TEST.

I do not bring these facts to your recollection without a purpose. They are submitted as conclusive evidence of the gulf which separates the best organizations from the worst. Between these extremes are undoubtedly to be found representatives of nearly every intermediate degree. In fact, the same organization will not infrequently appear, within a short period, to be guided by utterly divergent ethical and economic principles. Such a lack of stability is of course unfortunate, but it is attributable to a cause that operates in all voluntary associations, and at times even in the state itself; absence of interest on the part of those whose influence, if exerted at all, would usually fall on the conservative side. The conclusion to be drawn from these facts is an important one. They establish the principle that every labor organization and every demand of a labor organization must

be treated, and ought to be treated, according to its independent merit. It is impossible to generalize far beyond the right of workmen to organize, a right which no sane student of industrial affairs and no intelligent employer of labor ever now disputes. Workmen have the right to organize and to do so on such terms and for such lawful purposes as seem good to them, but employers have an equal right to refuse to deal with organizations whose purposes or methods would lead to a loss in efficiency and to reject particular overtures whose acceptance would have that effect. Employers who earnestly desire to accord to a movement, the persistence of which against great opposition and in spite of enormous obstacles of internal origin, establishes the economic soundness of its central principle, will always strain a point in favor of dealing with labor organizations. Indeed, no employer ought to decide to refuse to consider an offer to make a collective bargain on the part of his employees except on the most convincing grounds and with the greatest reluctance. To destroy one labor organization is but to prepare the way for another, and the elimination of one set of labor leaders will never be more than the signal for others to enter upon the scene. Nor are the new organizations and the new leaders always to be preferred to the old.

FAIR TREATMENT FOR FAIR EMPLOYERS.

The character of a labor organization is to be measured by its acts and by the principles to which it adheres. The most common tests of character relate to the treatment of non-union men, restriction of output and the strike. Before any of these, but not detracting from their importance, I should put the attitude of the organization toward the fair employer. What objection can be raised to the declaration that neither a fair workman nor a just organization will enter into an agreement which

may compel unfair treatment of a fair employer. Yet this principle, so obviously just, is openly and constantly violated by organized labor. Before the recent Anthracite Coal Strike Commission, witness after witness among those called on behalf of the striking mine employees, testified that prior to the great strike of 1902, he had no grievance against his employer, the Philadelphia and Reading Coal and Iron Company. This great company enjoyed an unimpeachable record for fairness to its employees, and among them there existed no doubt that should unintentional wrong occur it could readily be brought to the attention of its mining superintendent and would be promptly and completely remedied. The man who holds this position, John Vieth, has spent more than half a century in the anthracite mines, beginning as a day laborer. He knows the mines and the miners as probably no other man has ever known or can ever know them; his sympathies are broad; his manner, frank; his honesty, rugged; his fidelity to the industry and every man in it, impartial and unbreakable. The Reading company reduced the price of powder a full decade before its competitors; it established the sliding scale of wages; it never owned a company store; it long ago established an employees' insurance fund, and it pays its miners on the simple per-car and per-linear-yard systems. Yet the organizers, who were sent to the anthracite fields from Illinois in the early part of 1900, were able to induce the employees of the Reading to pledge themselves to an agreement binding them to desert their fair and generous employers whenever the miners in the northern and western anthracite regions should feel sufficiently dissatisfied with the wages or conditions in their fields to demand a general strike. This is precisely what happened in May, 1902. The satisfied employees of the Schuylkill region had no

desire to strike, but because the men of the other regions desired to do so, they consented to attack the prosperity of the company which had brought prosperity to them, and, with no grievance of their own, to strike a severe blow against American industrial stability. This action is typical of hundreds of instances in which the most generous fairness on the part of individual employers has failed to protect them against sharing the penalty of real or fancied unfairness on the part of the owners of other establishments with which they had no connection. In fact, with few exceptions, it is the current practice of American unionism to refuse any special protection to the employer who distinguishes himself from his competitors by the liberal treatment of his employees while, in a spectacular manner and with unbending spirit, visiting the sins of those who displease them alike upon the just and the unjust. Such a practice is destructive of the legitimate ends to be gained by organization. It places the generous employer at a greater disadvantage than that resulting from the ordinary competition of his rivals, and utterly destroys the business advantage that ought to go with righteous methods.

The principle which requires the fair treatment of fair employers must be established as a part of the creed of unionism before the latter can become a genuine means of industrial and social betterment. This would require the revision of some very prominent features of the methods now current among labor organizations; it would abolish the sympathetic strike and also the general strike which, in recent instances that all will recall, has frequently paralyzed the industry of entire sections. It would leave labor controversies to be settled by the parties directly concerned and would pretty effectually deprive both of the equally fickle support and opposition

of public sentiment based on mere personal inconvenience and annoyance.

TREATMENT OF NON-UNION MEN.

The attitude of many numerically strong labor organizations toward those workmen who refuse to join their ranks approaches closely to a denial of personal freedom in matters concerning which no liberty-loving individual can submit to dictation. No organization except government can, with the sanction of the intelligent and far-seeing, be permitted to demand allegiance. Yet many labor leaders declare that no workman has a moral right to remain aloof from their organizations, and compare those who dare to do so with those guilty of treason in its most repulsive forms. This doctrine has its natural consequence, during the stress of great strikes, in violence directed at the persons and property of those who give practical expression to their independence by retaining employment against the wishes of their fellows or by accepting positions abandoned by those on strike. It would be absurd to expect any other result. Idle men of somewhat limited culture, of violent passions and possessing a strong sense of the solidarity of their class, with abundant opportunities for the development of mob spirit, will always attempt to compel obedience to what they regard as the moral law when convinced that those who violate it are doing so to the positive injury of their class. Hence, when John Mitchell and other leaders in the great strike of 1902 proclaimed against violence, in the abstract, with one breath, and with the next compared the men who were at work to Benedict Arnold and to the tories of the Revolutionary period, they laid a foundation upon which it is not strange that other men, whose opportunities to acquire self-control had been more limited than their own, should erect a superstructure of

violent interference with the rights of others.

These leaders did not even verbally condemn the use of the boycott for the purpose of enforcing the new commandment: 'Without permission of the majority thou shalt not work.' It was invoked to drive the daughters and sisters of non-union men from employment as teachers in the public schools and in the factories, to prevent medical attendance upon the sick and to interfere with the interment of the dead. Its most common use was to deprive families of the necessities of life, and fathers who sought work for the sake of their little ones were sometimes compelled to see them suffer from hunger because no one dared to sell them food. From this expedient to dynamite how short the step. No one need be surprised that it was repeatedly taken.

THE VOICE OF AUTHORITY.

It still remains to be seen whether those who have been most prominent in inculcating this new doctrine of the depravity of refusing to join an organization and especially of insisting on the right to work on terms which are unsatisfactory to others will learn wisdom from the Anthracite Coal Strike Commission and the President of the United States. To appreciate the contrast between their teachings and those of the great, extra-legal labor commission and the President who created it, it is necessary to compare certain expressions of Mr. Gompers and Mr. Mitchell with the later official utterances of the commission and the President.

Mr. Gompers is the author of the following:

* * * The individual workman who attempts to make a bargain with the directors, or the representatives of such a directorate, simply places himself in the position of a helpless, rudderless craft on a tempestuous ocean. If he did but himself a wrong we might pity him and concede not only his legal but his moral right. But for the workman

who toils for wages and expects to end his days in the wage-earning class, as conditions seem to point, it will be a necessity, his bounden duty to himself, to his family, to his fellowmen and to those who are to come after him to join in the union.

Mr. Mitchell's expression is, perhaps, still more forcible. He said of the non-union man who works during a strike that:

He is looked upon, and I think justly, in the same light that Benedict Arnold was looked upon, or any traitor. He is a man that fails to stand for the movement that the people stand for, and, after all, the majority of the workers in any particular community reflect the public sentiment of that community. It is the movement of the people of that community, and if a man wants to desert his fellow workers and wants to prevent them from accomplishing good ends, then he is justly looked upon with disfavor by those who are right, because his working does not affect himself alone. If it only affected himself, it would be a different proposition, but the fact that he works helps to defeat the objects of the men who go on strike.

And then, answering the inquiry whether the 'lives of the wives and children' of the men he had thus condemned ought 'to be made unendurable,' Mr. Mitchell declared:

I think those wives and children had better ask their fathers.

Both of the foregoing declarations constituted part of the record before the Anthracite Coal Strike Commission when it unanimously adopted a report containing the following:

The non-union man assumes the whole responsibility which results from his being such, but his right and privilege of being a non-union man are sanctioned in law and morals. The rights and privileges of non-union men are as sacred to them as the rights and privileges of unionists. The contention that a majority of the employees in an industry, by voluntarily associating themselves in a union, acquire authority over those who do not so associate themselves is untenable. * * * It should be remembered that the trade union * * * is subordinate to the laws of the land and can not make rules or regulations in contradiction thereof. Yet it at times seeks to set itself up as a separate and distinct governing agency, to control those who have refused to join its ranks and to consent

to its government, and to deny to them the personal liberties which are guaranteed to every citizen by the constitution and laws of the land.

Finally, exercising the authority voluntarily accorded to it under the terms of the submission, the commission established the wise and salutary rule:

That no person shall be refused employment, or in any way discriminated against, on account of membership or non-membership in any labor organization; and that there shall be no discrimination against or interference with any employee who is not a member of any labor organization by members of such organizations.

It is very highly to the credit of organized labor that among the seven members of the tribunal which, without a dissenting voice, enunciated this fundamental principle of fairness toward all labor, sat the distinguished chief of the Brotherhood of Railway Conductors, probably the ablest of the living labor leaders of America, Edgar E. Clark. The last paragraph quoted has received especial presidential approval, having been quoted in full in President Roosevelt's letter of July 13 last to the Secretary of Commerce and Labor, in which it is followed by these words:

I heartily approved of this award and judgment of the commission appointed by me, which itself included a member of a labor union. This commission was dealing with labor organizations working for private employers. It is of course, mere elementary decency to require that all the government departments shall be handled in accordance with the principle thus clearly and fearlessly enunciated.

Thus in decreeing that every productive establishment of the federal government should be an 'open shop,' in which there should be no discrimination among American citizens on account of race or creed or membership or non-membership in any legitimate organization, the President in the plainest terms gave the weight of his endorsement to the sound doctrine that the discrimination thus forbidden in the workshops of the government ought not, any-

where, to be permitted. The freedom of American workmen could not survive the general abandonment of the 'open shop.' It is infringed whenever there is any discrimination such as can no longer exist in the government shops. Workmen who have faith in their own abilities, who treasure the liberties won for them by their predecessors here, who realize the spirit and the beauty of the Golden Rule, will not seek to debar others from the right to work on account of a disagreement as to the propriety of the terms and conditions on which work can be obtained. The 'union label' is one of the milder measures for compelling men to join organizations against whose principles or practices they wish to protest by remaining aloof from them. He who refuses to purchase goods not having this label is attacking the independence of some fellow-citizen. The employer who weakly assents to its use becomes a participant in a conspiracy against those workmen who dissent from the principles or methods of those who control the organizations in their fields. It is not pleasant to condemn a device which does afford some guarantee that the goods to which it is attached are not produced under oppressive conditions, but while giving partial protection against this danger the 'union label' threatens one of the most fundamental and sacred rights of every individual. Divest it of its proscription of the non-union man and its power for good will win for it deserved welcome from all right-thinking men.

RESTRICTION OF OUTPUT.

There would be little utility in discussing the restriction of individual output in its theoretical aspects. That the practice is unsound in economics is recognized by all students and even by those leaders of labor organizations who are unable to deny that it is followed, more or less extensively, by the members of their organizations.

This general condemnation of the practice makes it extremely difficult to determine its extent, but no one doubts that in one way or another it is a characteristic of most unions. It can not, however, be said to have originated with them. Whenever two men work side by side, for an employer, there is a decided tendency to limit the labor of both by the capacity of the less skillful and energetic. As the number of workmen increases the tendency in this direction is inevitably strengthened, and while there may be some increase, through example and emulation, in the labor of those who would do the least if working alone, the net result is always expressed in an average that is much nearer the capacity of the least capable than that of the most efficient. All this will happen in any establishment without the aid of a labor union. What, then, is the consequence, in this connection, of organization? Usually its first effect is that the restriction which was formerly tacit and somewhat irregularly enforced is reduced to a set of definite regulations that are systematically enforced. It may not become greater in amount, although it is not unlikely that it will. There is some evidence, however, that the improved economic perception on the part of labor leaders is causing the older organizations to abandon their efforts in this direction. Yet the recent growth of the unions in numbers and power, and the reluctance of employers to resist their aggression in this particular, during a period of such tremendous general prosperity that nearly every productive establishment was taxed to its utmost capacity, have undoubtedly led to an extension of the practice of restriction which must be checked. The unit of production per employee per hour has suffered a very considerable decrease in almost all American industries during the last six or seven years, and this diminution of effectiveness

has placed a more severe burden upon industry than the enhanced wages by which it has been accompanied. The record of the United Mine Workers in the Anthracite region is probably an extreme one, but it can be more advantageously studied than any other on account of the elaborate investigation prosecuted last year. The testimony taken by the Strike Commission contained instances of probably every conceivable method by which the output of a body of workmen can be kept down to the level fixed by the least able and industrious. Those who dared to rebel against rules restricting their earnings were subjected to the ill-will and the systematic oppression of their less intelligent and energetic comrades, until they either became less efficient or were driven from the mines. It is necessary to be patient with folly that springs from ignorance, but there is little excuse for leaders who, knowing the truth, do not use all their tremendous influence to spread an intelligent understanding of the simple economic principles which would at once destroy this most vicious of self-limiting practices.

STRIKES.

That recourse to the strike should ever be necessary is wholly deplorable, but the condition of men whom the laws deprived of the use of this industrial weapon of last resort would be indeed pitiable. Freemen must have the right to work and the right not to work, and they may not be impelled to choose the former by any command more imperative than that springing from their own desire to enjoy the fruits of exertion. The whole fabric of industry and commerce rests on bargains toward which there is no compulsion stronger than this. Between the buyer and seller of commodities there are successive offers and counter-offers until a point acceptable to both, but less satisfactory to either than his orig-

inal demand, has become the point of contract. The corporation and the 'trust' do away with a great deal of dickering between individuals, and in a precisely similar way the labor organization attempts to substitute a single collective bargain for a multitude of individual bargains. If, however, the corporation and the trust are unreasonable in their demands, every one now knows that the potential competition of smaller concerns, which always exist, is speedily actualized and the productive organizations that have shown their commercial incompetence to bargain reasonably with buyers are destroyed. So it should be with labor organizations. Those organizations which are reasonable in their demands will usually establish their right to survive by remaining at peace with the employers; those whose frequent strikes and repeated complaints of the alleged tyranny of employers prove their inability to bargain are usually inefficient in their efforts to promote the interests of their members and ought to pass out of existence. Yet the decision as to the terms which they will accept must always be left with the workmen, organized or unorganized. The right to strike ought to be used rarely and reluctantly; its use should always throw the burden of justifying its course at the bar of public sentiment jointly upon the employed and the employer; it can never be necessary except by reason of the grievous fault of one party or the other: yet it may be necessary and the greatest protection against its becoming so, save that which lies in the development and spread of a broad and intelligent spirit of humanity, lies in its exceedingly careful preservation. Generally speaking, however, the union which strikes on small provocation and frequently is to be classed among those which are undesirable, and the credit of any labor organization ought to be in inverse proportion to

the frequency of its resort to this extreme method of enforcing its demands.

As somewhat justifying the assumption that every strike is evidence of lack of capacity somewhere, and perhaps indicating where the blame more frequently resides, I would call your attention to the very large number of strikes which always attend the transition from a period of great industrial prosperity to one of relative depression. The interpretation of this phenomenon is very simple. From almost the beginning of a period of prosperity the leaders of organized workmen perceive that their position is one of growing strength. The demand for products is a demand for labor, and as the one is expressed in rising prices the other is naturally translated into rising wages. Organizations formulate their demands, make them, and they are granted. New demands and new concessions follow in an alternation which becomes more rapid as prosperity appears more intense, the willingness of employers to grant even seemingly extravagant demands as to wages or conditions being based on a confidence in the continuance of heavy demand and high prices which often amounts almost to intoxication. While this process has been going on the effect of high wages and reduced efficiency is being transferred to the consumers, always with some addition to make up for the exactions of those in charge of production. Naturally, this can not continue forever. Sooner or later there is a consumers' 'strike.' That is, high prices ultimately reduce the effective demand, orders come less freely, the bubble is about to burst. Employers rather promptly perceive the situation more or less clearly; labor too frequently does not. More wages or less work, or both, are again demanded, and, as this time the employers see that the cost of acquiescence can not be shifted or realize that a curtailment of pro-

duction must soon occur, the demands are refused. The strike which, if the workmen are ill-advised, follows, marks the turning point from prosperity to depression.

The other typical strike is a protest against a reduction in wages when the decline in commercial activity is in progress, or before the change to perceptibly better conditions has arrived. Such strikes are less frequent but much more likely to be creditable to the judgment of the strikers. Employers rarely refuse reasonable demands while industry is prosperous and the labor market empty or nearly so; some of them do attempt oppressive reductions in wages or unjust modifications in conditions when the times are dull and the labor market glutted with the unemployed. This is not to say that radical reductions in wages may not be necessary; they are very apt to be after such a period of unprecedented activity in every line of industry as that which is but just closed or closing, but it should be recognized that when due allowance for the changed conditions has been made everywhere there may be some employers who will endeavor to take advantage of the situation and to deal unjustly with their workmen. May the number of such employers be few and the resistance of their employees wise, fearless and effective.

OTHER TESTS.

The character of any labor organization is further to be tested by its principles and practices in reference to labor-saving machinery, profit sharing, pensions, insurance funds, home ownership by its members, admission of applicants for membership, apprentices, the boycott, the manner in which it conducts itself toward other unions, and its rules and general policy. The verdict of intelligence concerning most of these matters is so clear that discussion would hardly be warranted. A wise policy will prevent any labor union from discour-

aging the introduction of improved machinery, from refusing to accept or opposing fairly formulated efforts of employers to obtain greater loyalty from employees, from counseling against the ownership of homes, from upholding the boycott, from preventing the industrial education of intelligent youth, and from permitting controversies with other unions to interrupt work or occasion inconvenience to blameless employers. That particular organizations have grievously erred in these matters is, perhaps, much better known than that some have stood steadfastly for sound principles.

These defects in the current beliefs and practices of some prominent labor organizations have been pointed out in no spirit of intolerance. The evils are widespread and serious; they must be plainly pointed out and bravely overcome; but they are not necessary accompaniments of such organizations. In fact, as to most of them the history of several highly successful unions can be cited to show that among organizations composed of the most intelligent workmen they are likely to be eliminated. It is even more true that the much less pardonable practices which involve blackmailing employers and combinations with unscrupulous representatives of capital to rob consumers and destroy competitors are merely temporary consequences of an early recognition of strength which is not restrained by a sobering consciousness of responsibility or by ability to perceive the consequences of such injustice.

VALUE IN ORGANIZATION.

The conclusion is that while the labor problem must always persist, the organization of labor will continue and will increase its power to be of service, not only to workmen but also to society. The principle of organization will not only survive the defeat and destruction of those organi-

zations which obstinately adhere to vicious principles and practices, but the genuine progress of the labor movement will be substantially advanced every time such deserved defeat is administered.

ARBITRATION.

While this progress is being made toward the attainment of better things and substantial results are awaited, the public properly searches for a means of preventing or mitigating the annoyances and losses that spring from the interruption of production caused by labor conflicts. Until employers and employees learn such sweet reasonableness in bargaining together as to avoid strikes how shall their number and their evil consequences be reduced? Obviously the demand is for a temporary remedy for a difficulty which ought ultimately to disappear. With this fact kept carefully in view it is safe to consider the remedy of arbitration. This has actually but one form. To be arbitration at all it must be wholly voluntary. The term compulsory arbitration is self-contradictory, and however it may be disguised it really means the creation of a new type of court endowed with authority to make contracts relating to labor services. Arbitration—voluntary arbitration—is a term so grateful to the ear to which it comes as a substitute for the clash of bitter industrial struggles that it seems ungracious not to commend it without qualification. If men can not agree what can be better than to submit their differences to the settlement of a disinterested and impartial third party? *If men can not agree.* This qualification begs the entire question. Reasonable men can agree and unreasonable men must become reasonable or be replaced, in industrial affairs, by those who are. One way in which unreasonable men arrange for their own replacement is by getting themselves into situations out of which they can

not be extricated except through the assistance of others. The adjustments of industry are too delicate to endure, without injury to all concerned, the frequent interference of the disinterested. A strong personal interest is the element which is most effective in preventing irreparable mistakes. Arbitration may be the smaller of two evils, but no one should fail to recognize it as an evil. Aside from the fact that it leaves the determination of matters of primary industrial importance to persons who will neither gain nor lose by the success or failure of the industry, it is evil in its consequences, because, when there is reason to rely upon its being arranged for, that fact constitutes an incentive to making, and insisting upon, unreasonable demands. The easy-going policy which consents to the submission of questions vitally concerning the welfare of an enterprise to persons who have no stake in its success naturally leads to the easy-going method on the part of arbitrators which is expressed by 'splitting the difference' between the conflicting demands of both of the contending parties. This is the almost uniform result of arbitration. If you will turn to the decision and award of the recent Anthracite Coal Strike Commission you will find that that ablest and most impartial of arbitration boards was not able to avoid this nearly inevitable result. In its pages you will read the contradiction of every substantial averment of the striking mine workers. You will find that the wages of the employees of the anthracite operators did not, in April, 1902, compare unfavorably with those of bituminous miners or men in other employments of similar character. You will find that the conditions of life and the standard of living in the anthracite counties of Pennsylvania were not lower than in comparable regions. You will find that the basis of payment was not unfair to the workmen.

You will find the United Mine Workers described as a body too strongly influenced by bituminous coal interests to be a safe factor in the anthracite industry. You will find that boys voted at its meetings and gave a reckless tone to its management. You will find that the period of the great strike was one of lawlessness and violence, which the leaders of the organization could not or, at any rate, did not effectively check. So much the gentlemen of the commission gathered from unimpeached and unimpeachable testimony, and so much they clearly, concisely and fearlessly set down in the permanent record of their arduous and graciously accepted task. But after bravely announcing these facts in terms quite equivalent to declaring that the strike had no justification, the commission yielded, as any other arbitrators would have yielded and as nearly all arbitrators will yield in future controversies, to the impulse, commendable in itself, to deal generously with those who have relatively little and awarded a general advance in wages.

'COMPULSORY ARBITRATION.'

The term compulsory arbitration in the literal sense of the words is a verbal absurdity, but it refers to a definite idea and one fairly understood by all. Those who favor it urge that when men will not reasonably agree on a contract relating to wages or other conditions of employment, and will not agree to let some third party make a contract for them, they ought to be compelled to adopt the latter course. The adherents of this view are very apt to begin their argument with the assertion that 'there are three parties to every strike'—the strikers, the employer and the public. They quite understate the number; there are five. There is, of course, always the public or rather the consuming public. Then on the side of labor there are always

those, mistaken and misguided, perhaps, but American freemen after all, and entitled to that liberty under the law which has been described as 'freedom to do as you please and take the consequences,' who are willing to work on the terms rejected by the strikers; as well as those who have declined to work. On the side of capital, there may be supposed always to exist some one, over-sanguine, perhaps, but entitled to experiment as he would with his own, who would employ the strikers on their own terms; as well as the former employer. Compulsory arbitration shuts its eyes to both those willing to work for the rejected terms and those willing to become employers on the terms demanded. It sees only the old employers and the old employees, and would force them to continue the industry on terms very likely to be unsatisfactory to both. Manifestly, when this court of so-called arbitration has issued its decree containing the terms of a new labor contract, it must have some effective means for its enforcement. But by what process, consistent with freedom, is an employer to be compelled to pay wages that he believes must lead to bankruptcy, or employees to work on terms which they regard as so unjust that they prefer idleness to their acceptance? Such power is beyond the limits of governmental authority as they are established in the conditions essential to the preservation of human liberty. Men must be free to contract or not to contract, to work or to refuse to work, to remain in an employment or to leave it, to utilize their wealth as capital or to withhold it from the fields of production, to open their workshops or to close them, and there can be no limitation upon their rights in these particulars except as fixed by their own voluntary contracts, which does not dangerously reduce the liberties of the citizen. Public opinion may praise or condemn the manner in

which you or I exercise our legal rights and privileges, and in the face of it we may be driven to act otherwise than as we would. This pressure is legitimate, and when the public is not led astray by prejudice or wrongly instructed by demagogues the compulsion of its intelligent opinion often has salutary results. There can be no objection to this sort of compulsion, and if it leads to the arbitration of individual disputes, which would otherwise have caused prolonged and bitter strikes, it probably leads to the choice of the least evil of the available ways of escape from a condition too evil in itself not to result in some more or less permanent inconvenience. The difference between the compelling pressure of public opinion and the exercise of governmental authority is wide. If such authority is used by officers of a government to which power to compel arbitration has not been delegated, then that government has undertaken to over-ride its own laws, and regard for the law by the officers of government constitutes the whole difference between a despotic government and one which rests on the will of a free people. The humblest American citizen and the wealthiest American corporation are alike entitled to exercise every right which they possess under the laws which the people have made, and when any particle of the power or the prestige attaching to official position is used to curtail the liberty of either that of both is endangered. Public opinion may condemn a particular act which is not in violation of any law and, if unanimous and strong, it will usually be obeyed; but the hand of government must never be lifted to hasten the compliance. So long as the act is legal, government and the officers of government have no business with it. If the popular respect attaching to the most exalted office in the land has lately been made a means of compelling men to submit to arbitration the manner in

which they shall exercise the rights which no one denies are theirs, there has been a misuse of official position and a precedent has been established which, if followed, will sooner or later seriously impair the quality of American liberty. Compulsory arbitration has been rejected by organized labor, and when Americans generally comprehend what is meant by that term they will have none of it whether through statutory enactment or by the unauthorized action of even the highest officer of their government.

THE OUTLOOK.

But if voluntary arbitration is no more than a temporary and rather dangerous makeshift, and compulsory arbitration is utterly to be condemned, what can be done? The answer has been given—men must learn to bargain together reasonably. The remedy ought to appeal to us more because it is a process and not a panacea for all the ills of industrial conflict. That men can learn to settle their disputes over wages without outside aid, and that unions can make and keep collective bargains, has been abundantly proven during the recent industrial experience of the United States. All that is required is that there shall be more of this reasonableness and much less of its opposite. That this will come with the growth and spread of intelligence there need be no doubt. When workingmen and employers scrutinize more thoroughly the conditions by which their relations are fixed they will appreciate the wastefulness of friction and will know that reasonable dealing and the observance of the Golden Rule constitute the best of all policies. In attaining this state of higher intelligence organizations of employees and of employers will bear an important and useful part. Whatever evils may be discovered in the current practices of either class of organizations, however absurd the doctrines or crude the practices of some of them, no

matter even how ill-advised their leadership, the contact of man with man which they directly cause, must, in the long run, lead to higher principles and better methods. Satisfaction with the distribution of the results of productive effort as between wage earners and capitalists, we shall not see. Probably, if we did see it, we should wish for a condition which gave more occasion for effort and more justification for hope. But while complete satisfaction with the proportions received is neither likely to be attained nor properly to be considered as entirely desirable, the time when much of the present friction shall have disappeared is already very clearly foreshadowed.

H. T. NEWCOMB.

THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.

THE seventeenth annual convention of this association, held in Washington, November 17-19, 1903, was one of the largest meetings in point of attendance which has ever been held. Something over 200 delegates and visitors were registered, and the representation was very general from different sections of the country.

As has been customary for several years past, the annual meeting of the official horticultural inspectors was held during the days of the convention in conjunction with the meetings of the section on entomology.

The convention as a whole was notable for its harmony and the expedition with which business was transacted, and was remarked by many of the delegates as a most satisfactory meeting.

The address of the president of the association, James K. Patterson, of Kentucky, dealt with the general topic of the origin and work of the colleges and universities represented by the association, and the influences

of these institutions upon the development of technical and industrial education.

One of the most important items of business was the consideration of the amendments to the constitution proposed at the Atlanta meeting. These amendments had been before the association for a year, and were adopted with practically no discussion. They provide for a reduction in the number of sections to two, one on college work and administration and the other on experiment station work, three members of the executive committee to be chosen by the first section and two by the latter. There is provision for each section to create such divisions as it may find desirable, but no such divisions have yet been made, and the report of the committee on the organization of the new section for station work recommended that for the present no such divisions be made. The section on horticulture and botany, however, expressed a desire to continue its meetings in the future, and appointed a committee to confer with the executive committee with reference to this matter.

The report of the bibliographer, A. C. True, called attention to the more important bibliographies which have appeared during the year, a list of 110 bibliographies with explanatory notes constituting the main part of the report. Special mention was made of the 'International Catalogue of Scientific Literature,' several parts of which have been noted in this journal. The incompleteness of this catalogue in regard to certain lines of work in agricultural science, notably that of the experiment stations, was a matter of much regret.

The standing committee on indexing agricultural literature called attention in its report to the index cards for the publications of the Department of Agriculture which are being prepared by the Department Library, and also to the cards for the accessions to this library. The latter are

now being printed by the Library of Congress, and can be obtained at small cost, as may also the catalogue cards of the Library of Congress relating to agriculture. The card catalogue of the Department Library now contains over 110,000 cards, and the library is thus in position to render more efficient aid than ever before to the agricultural colleges and experiment stations, by furnishing them information in regard to the literature on particular topics, loaning books, etc. Attention was called in this report to the combined index, now in press, to the first twelve volumes of 'Experiment Station Record,' and to the card index of agricultural literature issued by the Office of Experiment Stations.

The report of the committee on methods of teaching agriculture, presented by A. C. True, was on the relation of the natural sciences to agriculture in a four years' course, and presented a plan for a course of study including these natural sciences and noting in brief the principal subjects under each to be covered. The report pointed out that the older method of arranging the courses in agriculture tended to make experts in analytical or agricultural chemistry or in pathology, rather than to give a broad training in agriculture and the natural sciences. It was urged that there should be a sufficient period of general study before specialties are taken up, and that the paths of the specialist and the agriculturist should early diverge. The college course can not be expected to fit men for expert work in the Department of Agriculture, and the experiment stations, but for this work at least a master's degree and ere long the doctor's degree are likely to be required. This paper brought out much discussion, illustrating the marked interest which has developed within the past few years in the matter of courses of study and in agricultural education of different grades. The work

of this committee was highly commended and was pronounced one of the most important features of the association's work.

The standing committee on agricultural engineering presented its first report through W. E. Stone, chairman. The report pointed out the increase in the number of engineering problems in agriculture and their prominence, the enormous extent to which agricultural machinery, and especially that of a complicated character, is being used by American farmers, the problems of irrigation and of drainage, the terracing of hillsides, the construction of roads and other topics, as illustrating the desirability of more systematic attention to instruction in these topics in connection with the college courses, and of extended scientific investigation. The courses in rural engineering in the colleges, it was stated, have not kept pace with the progress of the times. The committee declared in favor of separate departments of rural engineering in the colleges, the enlargement of the work of the Department of Agriculture to include agricultural engineering in addition to irrigation, and recommended that the executive committee of the association aid in securing the increased appropriation asked from congress for this purpose. This report was adopted, as was also a resolution commending the work of the Department along the lines of irrigation. The report brought out considerable discussion and indicated that this matter is occupying the attention of a number of institutions at this time.

The report of the committee on cooperation between the experiment stations and the Department of Agriculture, presented by E. A. Bryan, called attention to the statement of fundamental principles embodied in the two previous reports, expressed gratification at the appointment of a committee within the Department of Agriculture for perfecting the details of a

system of cooperation, and reiterated its belief that a full and free consultation between the stations and the members of the department forces in regard to the work undertaken in the several states is very desirable and would do much to remove possible sources of friction.

The standing committee on uniform fertilizer laws, of which H. J. Wheeler is chairman, called attention to the satisfactory progress which is being made in the direction of greater uniformity, the recommendations of the association having been of value in securing the recent passage or amendment of fertilizer laws in Indiana, Florida, Missouri, Pennsylvania, Tennessee and other states. This report also included recommendations concerning the laws for feeding stuff inspection.

The report of the standing committee on pure-food legislation, made by W. A. Withers, noted considerable progress along the line of pure-food legislation during the year. New legislation was enacted in two states, and provisions made by congress for the inspection and control by the Department of Agriculture of foods imported from foreign countries. This was pronounced an unusually important step in food legislation, and its execution has resulted in considerable progress in the preparation of standards of purity.

The farmers' institute work which the Department of Agriculture has taken up was outlined by A. C. True, who stated clearly the policy of the department in regard to this work. There will be no attempt to interfere with the state management of farmers' institutes in any way, but rather to cooperate with the state officials and to aid them in building up the institutes in the several states. The department will be a general agency for coordinating and strengthening this work throughout the country. One of the main objects at present is to help to increase the

efficiency of the institute lecturers, now numbering over 800, less than half of whom are connected with the work of the colleges or the stations. A corps of specially trained institute workers was recommended as eventually desirable, to relieve the college and station men of much of the burden of this work, as it is the opinion of the department that the prime object of college men is to teach and of station men to investigate. The speaker pointed out the greatness and importance of the farmers' institute enterprise as a means for the future development of agriculture, of building up of a proper system of agricultural education and research, and developing a generation of farmers who will be in a position to appreciate and apply the results of the work of these institutes.

The following officers were elected for the ensuing year:

President—W. O. Thompson, of Ohio.

Vice-Presidents—D. F. Houston, of Texas; J. C. Hardy, of Mississippi; J. H. Worst, of North Dakota; H. J. Wheeler, of Rhode Island; and B. C. Buffum, of Wyoming.

Secretary and Treasurer—E. B. Voorhees, of New Jersey.

Bibliographer—A. C. True, of Washington, D. C.

Executive Committee—H. C. White, of Georgia; G. W. Atherton, of Pennsylvania; J. L. Snyder, of Michigan; W. H. Jordan, of New York; and C. F. Curtiss, of Iowa.

Section on College Work and Administration—Chairman, W. E. Stone, of Indiana; secretary, G. E. Fellows, of Maine; committee on program, W. E. Stone, of Indiana, G. E. Fellows, of Maine, and H. W. Tyler, of Massachusetts.

Section on Experiment Station Work—Chairman, E. H. Jenkins, of Connecticut; secretary, M. A. Scovell, of Kentucky; committee on program, J. H. Shepperd, of North Dakota, B. W. Kilgore, of North Carolina, and M. A. Scovell, of Kentucky.

In the meetings of the sections the most important papers and discussions were those on soil fertility, animal breeding, instruction in horticulture and botany, problems of forest entomology, methods of work in

economic entomology, the mission of the land-grant colleges and short courses.

E. W. ALLEN.

U. S. DEPARTMENT OF AGRICULTURE.

SCIENTIFIC BOOKS.

The Lower Devonian Fishes of Gemünden.

By R. H. TRAQUAIR. Transactions of the Royal Society of Edinburgh, Vol. XL., Pt. 4, pp. 723-739, pls. 7, 1903.

Dr. Traquair's recent paper will be welcomed as throwing light on *Drepanaspis*, one of the lowliest vertebrates. In earlier papers Dr. Traquair has briefly referred to this armored form, known only from the lower Devonian slates of Rhenish Gemünden: in the present memoir he completes his studies upon it, basing them upon a remarkable series of the fossil which he has collected during the past dozen years.

Gemünden fossils, one may note incidentally, are remarkable for the great beauty with which their external characters have been preserved, shown especially in mollusks, trilobites and starfish; and the armored fishes have proven no exceptions to the rule. The specimens however, are always pyritized and are therefore, unfortunately, valueless for histological study. Besides *Drepanaspis*, the only armored fish known hitherto in detail from this horizon, Traquair now describes a *Coccosteus*, a *Phlyctœnaspis* and two forms *insertæ sedis*. Of these the first, *Gemündina*, is a fish somewhat ray-like in form, characterized by a stout vertebral column and an integument well encrusted with shagreen denticles. What it is no one can say, although its describer regards it as 'possibly a chimæroid,' admitting, however, that his idea 'rests more upon feeling than upon anything else.' Until, therefore, more and better material can be secured one is constrained to conclude that nothing further need be said about its affinities. *Hunsrückia*, the second problematical form, is represented only by a series of vertebral arches whose structures suggest very doubtfully a pleuracanth shark. Regarding *Drepanaspis* the paper gives many interesting details, and they do not, we find, lead the author to alter his earlier opinion as to the

affinities of this form. He places it near the classic *Pteraspis*, and regards it as the more generalized, a view which will probably meet general acceptance. It is a source of satisfaction to students of these earliest chordates that in the present form both dorsal and ventral sides are now known with fair accuracy. Desirable, none the less, is a better knowledge of the region of the mouth, which is practically terminal, surrounded by a rather indefinite series of dermal plates, and of the lateral angles of the body, where possibly an opercular opening is situated. And while we are duly grateful to Dr. Traquair for his skillful and continued efforts to elucidate this remarkable form, we are none the less impatient for further details. The object is, at the best, difficult to orient, and as a symptom of this it may be doubted whether the interpretations of even an author of Dr. Traquair's experience and acumen are always valid. Thus, his grounds seem inadequate for distinguishing dorsal and ventral sides. In no specimen figured is the relation of the dorsal lobe of the tail shown convincingly to be continuous with the so-called dorsal aspect; moreover, the eyes occur on the side which Traquair regards as ventral. Unless additional evidence is forthcoming, it would accordingly seem to me more probable that the 'labial' of Traquair was the 'rostral' plate, a structure which appears constant in *Heterostracans*. This interpretation would permit the eyes to be seen at the sides of the dorsal armoring, as indeed, they occur in *Pteraspis*, and would enable us, at the same time, to locate the greater number of the larger plates on the dorsal side. This conclusion is the more satisfactory on comparative grounds, since there is not an instance in the chordate phylum in which the eyes and the most complete part of the armoring appear on the (morphological) ventral side. And I doubt whether, on the present evidence, we can assume, with Professor Patten, that *Drepanaspis* might have evaded the law of vertebrate orientation by swimming on its back. Dr. Traquair has attempted to solve this dorso-ventral difficulty by suggesting that either the orbits are 'sensory' pits, i. e., not orbits, or

that, 'since the specimens are all crushed absolutely flat, it is by no means certain that in the original uncompressed condition the openings did not look out to the side.'

BASHFORD DEAN.

First Report on Economic Zoology. By FRED. V. THEOBALD, M.A. London. 1903. Pp. xxxiv + 192.

Under the above heading F. V. Theobald, a high authority on economic entomology in Great Britain, has published, under the auspices of the British Museum (Natural History), in three parts, his initial report of economic zoology. The volume in question is preceded by an introductory chapter of some extent by E. Ray Lankester, consisting of a classification of animals from the point of view of economic zoology. The same writer has added considerable correspondence on the dreaded tsetse fly disease of Africa, termites or white ants and the locust plague of the same country, as well as other matters not pertaining to entomology. Mr. Theobald is well known from his valuable treatise on the Culicidae of the world, which has already reached the fourth volume. Although the main portion of the report is devoted to injurious insects and to other economical entomological questions, there is also frequent mention of the injury accomplished by mammals and birds and other pests as well as of fungous and other diseases. Much valuable information is furnished in regard to the means of preventing insect losses, a considerable proportion of which has been derived from actual experience or from reports of trustworthy persons. The work is not only of special interest and value to persons engaged in agriculture in Great Britain, but also to those of nearby countries in Europe, where many of the same species occur, although not always in the same degree of abundance. Many of the species considered are cosmopolitan, while others are common to North America and Europe, which makes the work also of interest to farmers of the United States. Among the most interesting species treated are the following:

The bud moth (*Hedya (Tmetocera) ocellana* Fab.), a well-known pest in the northern

United States; the mussel scale, or, as it is more familiarly known in America, oyster-shell bark-louse (*Mytilaspis pomorum* Bouché), the pear leaf and 'big bud' mites. Among potato pests is a species of caterpillar, *Hydræcia micacea*, which works in the same manner as our stalk borer, *Hydræcia nitela* Say, well and unfavorably known to potato growers in the United States. Frequent mention is made of injury by millipedes attacking potatoes and other useful crops.

Considerable attention is given to the occurrence of the Colorado potato beetle in England, more especially in Tilbury, where it has been established for some little time. Judging by this report of local occurrence, it would not seem difficult to stamp out the pest in that region so as to prevent its spread to other portions of the country and eventually to the continent of Europe.

The so-called leather jackets or maggots of the crane flies or daddy longlegs (Tipulidæ) are considered somewhat at length. Records are cited of injury to hundreds of acres of grass land by these insects, and it seems probable that much injury is done by related species (of which there are many) in the United States, which is undetected or attributed to other forms of insects.

There is always danger of introducing European species into America, and it is singular that some of the commonest pests of England have never found a complete establishment with us, for example, the thousand-legged worm or millipede, *Polydesmus complanatus*, which has undoubtedly often been brought to this country in soil and has been mentioned as occurring here, but which our authorities state has not gained a permanent foothold. The same is true of the ear wig, *Labia minor*, which is said to be a pest in Europe, well established in America, but never injurious, so far as we know, in our own country. Another species frequently found in old buildings, in furniture and in old wood generally and commonly called death watch, *Anobium domesticum*, is in the same category, having undoubtedly been brought here in wooden material but, for some unknown reason, failing to survive. Mr. Theo-

bald's work concludes with an appendix which includes a list of North American locusts and a list of African termites.

F. H. CHITTENDEN.

INTERNATIONAL CATALOGUE OF SCIENTIFIC
LITERATURE. GEOLOGY.

IN looking over the reviews that have appeared of the various parts of the International Catalogue of Scientific Literature thus far issued for the year 1901, it is evident that those which are extremely critical have been written by men who are largely investigators. The men who have spent days in the laborious work of going over publications, writing out the titles of papers and arranging them according to a predetermined subject classification are certainly more generous in their commendation.

The publication on geology is probably as satisfactory as any of the others. Its greatest weakness for the purposes of the whole body of geologists is that of omissions and the limited scope of the subject classification. Many papers that have been omitted appeared in publications that have not been examined. But the character of the publication to be examined was limited by instruction concerning which the workers had no voice.

The scope of the subject classification is one of very great importance to the working geologist. The mass of geological literature is so large that he no longer burdens his memory with the fact that certain persons wrote upon certain topics about such a time and in such a place. Modern methods demand that these papers be brought together under suitable headings and that these shall be sufficiently detailed in scope to meet the needs of the investigator. *The geological classification as it exists falls far short of filling this demand. This is not the fault of those who have prepared this bibliography, but the value of the publication under consideration would have been greatly enhanced if many papers had been brought out under more of the headings which were given them. This is due to the fact that probably much of this work of examining the literature was performed by persons who had no special knowl-

edge of the subject, the literature of which they were classifying. This work to be well done—and no other sort of bibliographic work is acceptable—must be performed by those who have a considerable intimate knowledge of that portion of science which they are indexing. It is well known that some of those who participated in the formation of this organization were of the opinion that this work of classification could be executed by persons having a good general scientific education. The first annual issue of the bibliographies illustrates how erroneous is such a conclusion. If the preparation of the material by each of the regional bureaus were complete and satisfactory, the work of collecting and unifying them into a whole must be one replete with difficulties.

It is not the purpose of this notice to point out particular errors of omission or commission or to note defects in a spirit of hostile criticism, but to indicate what is fundamentally inadequate with the hope that in due time it will be rectified. It may prove to have been a wise determination to carry on this work for a period of five years before holding a congress at which these questions of revision will be discussed and determined. But it is believed that a higher grade of bibliographic work would result if a larger measure of discretion had been given to the central bureau. The difficulties which attend the inauguration of such a peculiar work are, indeed, great, but they must be overcome, if the organization is to be permanent and the outcome of its labor to meet the approbation and support of those for whose benefit it is conducted. For the present the following suggestions are offered to those who have in charge the preparation of these bibliographies.

1. Secure the assistance of specialists as far as possible. Would it not be practicable to send to such persons a list of current periodicals, publications of societies, etc., to be examined for each regional bureau, and assemble and unify their work for transmission to the central bureau?

2. Enlarge the list of publications examined to include those which only occasionally publish articles which should be entered.

3. Classify in greater detail. Enter a paper under each subject heading of which it treats even though it seem unimportant.

F. B. WEEKS.

SCIENTIFIC JOURNALS AND ARTICLES.

THE *Bulletin of the Michigan Ornithological Club* for December contains articles on the 'Nesting of the White-breasted Nuthatch,' by Edwin G. Mummery; 'Purple Martin Notes from Waynesburg, Pa.,' by J. Warren Jacobs; 'Nesting of the Sandhill Crane in Michigan,' by Edward Arnold. There is the third series of portraits of Michigan ornithologists and other illustrations, including a half-tone of the University of Michigan Museum. Besides the papers above mentioned and the official 'Minutes of Club Meetings,' book reviews and the constitution of the organization there are numerous notes including 'Another Parasitic Jaeger (*Stercorarius parasiticus*) from Michigan,' by Alexander W. Blain, Jr., and 'Nesting of the Cardinal Grosbeak (*C. cardinalis*) in Ingham County, Michigan,' by Professor Walter B. Barrows, being the first authentic record of the breeding of the cardinal in the state. Beginning with 1904 Charles E. Wisner, of Detroit, will assume the business management of the *Bulletin*.

SOCIETIES AND ACADEMIES.

NORTH CAROLINA SECTION OF THE AMERICAN CHEMICAL SOCIETY.

THE seventh annual meeting of the section was held in the chemical lecture room of the Agricultural and Mechanical College, West Raleigh, on November 28, 1903, at 11 A.M., with presiding officer, Chas. E. Brewer, in the chair.

Preceding the presentation of papers a short business meeting was held and the following officers were elected for the ensuing year:

President—Dr. A. S. Wheeler, Chapel Hill, N. C.

Vice-President—Dr. R. W. Page, Raleigh, N. C.

Secretary-Treasurer—C. D. Harris, Raleigh, N. C.

Councillor—Professor W. A. Withers, Raleigh, N. C.

Reporters—W. G. Morrison, West Raleigh, and S. E. Asbury, Raleigh, N. C.

The following papers were presented and discussed:

Action of Ultra-violet Light upon Rare Earth Oxides: CHARLES BASKERVILLE.

See *American Journal of Science*, December, 1903.

On the Action of Radium Compounds upon Rare Earth Oxides and the Production of Permanently Luminous Preparations by Mixing the Former with Powdered Minerals: CHARLES BASKERVILLE AND GEO. F. KUNZ.

Will appear in *American Journal of Science*, January, 1904.

Phosphorescent Thorium Oxide: CHARLES BASKERVILLE.

As previously shown, thorium dioxide is one of the two rare earth oxides (zirconium dioxide being the other) and the only radioactive one which phosphoresces with ultra-violet light. This method of testing was applied to different fractions obtained from the thorium dioxide by volatilization of the chlorides. The three fractions obtained varied as follows: The residue (containing the carolinium) is only faintly phosphorescent, due doubtless to the retention of some thorium. The crystalline sublimate is about ten times as phosphorescent as the original oxide, whereas the very volatile fraction (*weisser Dampf* of Berzelius) does not phosphoresce at all. The last-mentioned preparation contains a little thorium. The radio-activity is greatest in the residue and least in the volatile body. The name *berzelium* is proposed for this third fraction of thorium.

A Simple Device for Illustrating the Periodic Law: CHARLES BASKERVILLE.

The device consists of blocks cut in length according to the atomic weight, taking one half inch for hydrogen. The blocks are planed, presenting flat surfaces corresponding to the valency. The electro-positive and negative properties are indicated by painting blue or red. When these blocks are arranged in an ascending series according to their heights, the resemblance of the properties of the ele-

ments in the different families of the periodic law is strikingly presented.

Upward Filtration and Its Application in the Determination of Crude Fiber: J. M. PICKELL.

This is a rapid method of washing and filtering fiber by sucking the fiber (contained in a beaker) up against a linen filter which is stretched across the top of a small funnel, or better, across a 'carbon filter,' which is provided with a rim for this purpose. The time consumed in a filtration is usually a fraction of a minute, but in the more difficult cases, two, three, four and in rare cases, ten or fifteen minutes. In the few cases tested (cotton-seed meal, wheat bran) it was found to pass (and thus lose) 0.2 per cent. to 0.3 per cent. of solids, which a good thick, but slow-filtering asbestos (Gooch) filter took out. With cotton-seed meal, corn bran, wheat bran, rice chaff, ground corn cobs, peanut hulls, peanut middlings, it gave duplicates agreeing within 0.01 per cent. to 0.30 per cent. A detailed description of the apparatus and method will be soon published. It is thought that unglazed terra-cotta disks and with suitable protection, even filter paper, especially the *hardened* variety, may be substituted for linen, and the method applied quantitatively to difficult filtrations other than those of fiber. Experiments in this line are in view.

The Constitution of Cellulose (a report): ALVIN S. WHEELER.

A review of the literature on the subject up to date. The empirical formula of the reacting unit is $C_6H_{10}O_5$. The evidence favors a cyclic formula for the unit. The fact that the tetra acetate of cellulose is a normal ester shows that four oxygens are hydroxylic. The fifth oxygen is carbonyl oxygen and the behavior of cellulose clearly indicates the CO group to be ketonic and not aldehydic. Fenton and Gostling's production of *o*-bromomethylfurfural from cellulose is exceedingly interesting in this connection. The provisional formula $CO < (CHOH)_4 > CH_2$ has many suggestions in it. The subject is a very complicated one. C. D. HARRIS,

Secretary.

THE AMERICAN CHEMICAL SOCIETY. NEW YORK SECTION.

At the regular meeting held on December 4 the section elected to the council of the society, Professors E. H. Miller and Virgil Coblentz, and Drs. Leo Baekeland, Hugo Schweitzer and Durand Woodman.

The following papers were then read:

The Dissociation of Lead Nitrate: LEO BAEKELAND.

Dr. Baekeland described the methods and results of an extended investigation of the dissociation of lead nitrate under different conditions and discussed the principles of chemical dynamics involved in the interpretation of his results. Several pieces of apparatus especially designed for this research were described and illustrated.

On the Conversion of Lead Sulphate to Barium Sulphate and a Method for the Determination of Sulphur in Lead Slags: E. H. MILLER AND J. F. THOMPSON.

This paper showed that the conversion which would be expected from the difference in the solubility products of the sulphates could not be made to take place, as the mechanical coating of the lead sulphate by barium sulphate or a barium lead sulphate always prevented complete conversion. By varying the procedure and dissolving the lead sulphate in hydrochloric acid, a satisfactory precipitation of SO_4 ions as barium sulphate was obtained. This was made the basis of a method for sulphur in lead slags. A variety of slags were tested in comparison with the Fahlberg-Iles method.

The End Products of Self-Digestion of Animal Glands (first communication): P. A. LEVENE.

Dr. Levene gave the results of experiments with the pancreas gland and the liver. The pancreas was subjected to self-digestion in a 0.5 per cent. sodium carbonate solution, the liver in a 0.2 per cent. acetic acid solution. The present report covers the examination of the end-products for amino-acids. Alanin, amino-isovalerianic acid, leucin, glutamic acid, phenylalanin and tyrosin were found in each case. The presence among the digestion

products of α -pyrolydin-carbonic acid could not be established with certainty.

A Restant Source of Error in Optical Sugar Analysis: F. G. WIECHMANN.

Dr. Wiechmann's paper dealt with the error due to the space occupied by the precipitate formed by basic lead acetate used as a clarifying agent. After a discussion of the extent of the error thus introduced in the examination of different classes of raw sugars, the author outlined briefly the results of a study of the methods proposed by Scheibler and by Sachs for the determination of the volume of the precipitate. This paper will be found in the *School of Mines Quarterly* for November, 1903.

Dry Defecation in Optical Sugar Analysis: W. D. HORNE.

Dr. Horne described a method for clarifying sugar solutions so as to avoid or minimize the error discussed by Dr. Wiechmann. The 'normal weight' of sugar is dissolved and diluted to 100 cubic centimeters and the solution clarified by the addition of pulverized anhydrous subacetate of lead. The acetic acid going into solution appears to replace in volume the organic acid, precipitated by the lead, so closely that the polarizations obtained on such solutions approximate the theoretical.

After the reading of the above papers, Dr. G. Plath, of Berlin, exhibited and explained a number of specimens of improved stoneware apparatus designed for use in chemical operations.

H. C. SHERMAN,
Secretary.

CHEMICAL SOCIETY OF WASHINGTON.

THE 146th regular meeting of the Washington Chemical Society was held Thursday, December 10, at 8 P.M., in the assembly room of the Cosmos Club. The program for the evening consisted of the following three papers.

The first paper, entitled 'The Bromine Absorption of Oils,' was presented by Mr. L. M. Tolman.

A comparison of the results obtained by different methods was made, and it was shown that the one third normal bromine in carbon

tetrachloride gave as high addition figures as the Wij's and Hanus methods, when the carbon tetrachloride was dry and the reaction was allowed to take place in the light. Moisture was found to have a very marked effect on both the addition and substitution values. The length of time necessary to obtain complete reaction was found to vary in the light, 30 to 60 minutes being necessary, while in the dark a definite point was reached in a very short time, but the results were much below those obtained in the light. Experiments were reported using iodine chloride and iodine bromide in carbon tetrachloride solution. The iodine chloride in carbon tetrachloride was found to be the most satisfactory.

The second paper on the program, entitled 'The Action of Sal Ammoniac on Certain Chlorides,' was presented by Dr. P. Fireman. The action of ammonium chloride upon inorganic and organic polychlorides in sealed tubes at temperatures about 450° C. was investigated. The author found that those inorganic polychlorides which are themselves dissociable, react with ammonium chloride in a manner similar to the reaction between ammonium chloride and phosphorus pentachloride. With respect to organic polychlorides, it was found that under certain conditions carbon tetrachloride reacts with ammonium chloride, with the liberation of hydrochloric acid and the formation of a yellowish compound which is probably a polymeric modification of cyanogen chloride.

The third paper on the program, entitled 'The Solubility of some Slightly Soluble Phosphates,' was presented by Dr. F. K. Cameron. The author briefly reviewed the literature bearing on the solubility of the phosphates of calcium, aluminum and iron, and gave a preliminary announcement of some experimental investigations he has been carrying on with Dr. Seidell and Mr. Hurst. It appears that the evidence obtained can not be brought in harmony with the indications of the dissociation hypothesis, even in very dilute solutions. But some of the apparent discrepancies between the hypothesis and the observed facts are undoubtedly due to the fact

that these substances are very slightly soluble in themselves, but hydrolize greatly with the formation of a readily soluble constituent.

A. SEIDELL,
Secretary.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 378th meeting was held on Saturday, December 12.

William H. Ashmead presented some 'Remarks on Japanese Hymenoptera,' stating that a recent study of specimens in the U. S. National Museum had raised the number of known species to over five hundred and fifty. Some of these were represented in eastern and southern Asia, while the relationship of the parasitic forms were largely North American. Specimens and drawings of some of the more interesting species were shown, including three distinct honey bees.

V. K. Chesnut and Harry T. Marshall gave "Some Observations on 'Locoed' Sheep." Mr. Chesnut described the symptoms of locoed animals; tendency to stray, loss of appetite for ordinary food, evident hallucination, outbreaks of violence, wasting of flesh and, finally, death. He stated that animals that had acquired taste for the loco weed rarely, if ever, recovered, and that in parts of the west the loss of stock was very considerable. The property of 'locoing' animals had been ascribed to various plants of the genera *As-tragalus*, *Aragallus* and *Datura*. Mr. Marshall gave the results of the examination of fourteen sheep, afflicted with the loco-disease, and selected from a number as showing typical symptoms. These sheep exhibited no special lesions such as might be considered characteristic of the complaint, but some of them were infested by various parasites. The speaker stated that while he believed in the existence of a loco-disease so far as these sheep were concerned, the actual observations showed that it had been preceded by other causes and that sheep enjoying full health had not been attacked.

Charles Hallock spoke of 'The Bison as a Factor in the Distribution of Aboriginal Population in Mid-Continental America,' stating that the introduction of the horse had enabled

the Indians of the southwest to follow the bison northwards into the plains, while as the country in the eastern United States became settled the forest Indians were crowded westward into the same localities, following the bison as a source of food. F. A. LUCAS.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 351st meeting was held December 1. Dr. D. S. Lamb read a paper entitled 'Albinism and Melanism,' in which he carefully reviewed the contributions to the study of this subject. Dr. Lamb spoke of the wide distribution of albinism among human beings, its occurrence among animals and plants and of the experiments in the latter fields to produce albinism. Albinism, he stated, is congenital and inheritable. The theories on the cause of albinism were reviewed. The more important took civilization and the direct action of the nerves as causes. It was concluded that no satisfactory explanation of albinism and melanism has yet been advanced. In the discussion Dr. Hrdlicka showed photographs and samples of hair of the Hopi and Zuñi albinos and observed that there are more female than male albinos at Moki, that several are below the average intelligence and many were second child in order of birth. Dr. Hrdlicka expressed his belief in the causal relation of the nervous system to albinism. He related an extraordinary case where the wings of an albino jay bird which he cut off in Mexico had returned almost to their natural blue color when unpacked in New York. The president, Miss Alice C. Fletcher, said that housing among the different tribes accounted for differences of complexion and that albinism has been explained in this way. The secretary said that the purpose of the study of albinism and melanism from the anthropological side was to ascertain the causes of race coloration, which has been a fruitful subject for theorization. The discussion was taken part in by Mr. Hallock, Mrs. Lamb and Mrs. Seaman.

Colonel Paul E. Beckwith read a paper entitled 'The Rise and Decline of the Sword. Colonel Beckwith pictured the conditions of the life of early times and showed that man

had to weapon himself for his protection. Prehistoric flint weapons which stand at the beginning of the sword were exhibited and traced along to the seft of Egypt, down through the various derivative forms in Africa, Europe and Asia in the different periods. Colonel Beckwith described the sword blade, the nomenclature of its parts and the reasons for the different forms, closing with remarks on the decline of the weapon incident to modern warfare.

The question of the preservation of the antiquities of the United States, which was laid over from a former meeting, was brought up by Dr. H. M. Baum, who urged action. Professor Holmes said that the Bureau of Ethnology has taken up the subject and that Mr. McGuire is engaged in examining the laws of various countries with a view to the preparation of an act for the United States. Dr. Baum suggested that a movement be put on foot to awaken public sentiment in the preservation of antiquities and to this end the society should petition and put the matter before congress. Dr. Lamb moved that a committee of five members be appointed to consider and report on the ways and means for the preservation of antiquities. The motion was seconded by Mrs. S. S. James, who spoke of the work in this line by the ladies of Colorado. The president thereupon appointed a committee consisting of W. H. Holmes, J. W. Fewkes, A. Hrdlicka, H. M. Baum and J. D. McGuire.

WALTER HOUGH,
Secretary.

BOTANICAL SOCIETY OF WASHINGTON.

THE sixteenth regular meeting of the Botanical Society of Washington was held at the Portner Hotel, December 5, 1903, with thirty-seven persons present.

The following program was presented:

1. *The Salt Content of Seabeach Soils*: T. H. KEARNEY.

Most writers upon the ecology of strand vegetation have implied, or even explicitly stated, their belief that the sands of the seabeach are impregnated with salt in amounts sufficient to determine the character of the plant growth. This hypothesis is not sus-

tained by an examination of samples of dune and beach sand taken on the shore of Buzzards Bay, Massachusetts, near Norfolk, Virginia, and near Los Angeles, California. On the contrary, the amounts of soluble salt present, as determined by the electrolytical method used by the Bureau of Soils of the United States Department of Agriculture, is generally less than that found in most cultivated soils in the eastern (humid) part of the United States.

The greatest amount of salt detected in beach sand occurred in a sample taken at Los Angeles, California, which gave an electrical resistance (at 60° F.) of 158 ohms (equivalent to about 0.15 per cent. of salt to soil) for the first foot, and 180 ohms (equivalent to about 0.12 per cent.) for the second foot, an amount not greater than that sometimes occurring in cultivated land in the eastern United States. We are, therefore, constrained to attribute the xerophytic character of sand-strand vegetation to factors in the environment other than the presence in the soil of an excessive amount of soluble salt.

On the other hand, coast marshes that are regularly inundated by salt or brackish water possess a distinctly saline soil, and their vegetation may safely be termed halophytic, so far as halophytes may be regarded as forming an ecological class distinct from other xerophytes.

2. *The Influence of Climate and Soil on the Transmitting Power of Seeds*: WILL W. TRACY, SR. This paper will be published later in SCIENCE.

3. *The American Ginseng Industry*: F. V. COVILLE.

HERBERT J. WEBBER,
Corresponding Secretary.

TORREY BOTANICAL CLUB.

At the regular meeting of the club held at the College of Pharmacy, December 8, 1903, the scientific program consisted of a paper by Mr. W. L. Horne on 'The Vegetation of Kadiak Island, Alaska.' The paper was illustrated by a large number of botanical specimens and by numerous photographs showing the topography of the island and the characteristics of the different plant formations. Kadiak Island is 58° north latitude and 155°

west longitude and is thirty miles from the mainland. It is twenty miles long by fifty wide and has a very irregular coast line. The surface is much diversified and broken. A fresh-water lake about twenty miles long is situated in the northwestern part of the island. It is connected with the sea by the Karluk River and furnishes an ideal breeding ground for the red salmon. One of the most important fishing stations and canning plants in the world is located near the mouth of this river. The winters are very long, beginning early in October, but they are not intensely cold. The lowest temperature during the two years of Mr. Horne's stay was -10° . There is much mild weather and there are frequent thaws. The soil only freezes to a depth of from one to two feet, and the frost is out of the ground early in June. The highest summer temperature noted was 72° . The Chinese laborers in the canning factory make gardens where they cultivate successfully many of the more hardy vegetables.

The principal plant formations discussed were those of the low-lying bogs, the comparatively level grass lands, the higher lying peat bogs, and the alpine flora occupying the rocky hills. Marine plants are not particularly conspicuous, though many brown and red seaweeds occur. Two species of *Potamogeton* are found in the river at the point where the salt and fresh waters meet. Above this point it is comparatively free from vegetation. The country is well watered by small streams. These are often full of various green algae and they are frequently dammed by dense growths of mosses. Some of the smaller slower brooks are completely blocked by dense growths of species of *Vaucheria*, which so retard the flow of the water as to form low wet bogs that are covered with a characteristic vegetation. The earliest plant to flower in the spring in these vaucheria bogs is the small *Claytonia asarifolia*. Other conspicuous spring plants are a species of *Rumex*, *Caltha palustris* and various species of the Cruciferae. These bogs are showiest in midsummer when filled with *Polemonium acutifolium*, several species of *Epilobium* and a handsome *Mimulus*. *Epilobium luteum* in particular forms showy

masses in the bogs and along the brooks. A large-flowered skunk cabbage also occurs in wet places, frequently marking the course of little brooks along the hillsides. *Carex cryptocarpa* forms a dense zone bordering portions of the river bank.

The drier and comparatively level grass lands are always completely covered by layers of mosses and lichens, so that they approach the condition of the tundras. The first spring flowers of the grass lands are the abundant pink blossoms of the little *Rubus stellatus*, which is also a conspicuous plant in the fall from the rich coloring of its leaves. The turf consists mostly of *Carex Gmelinii*. Scattered plants of species of *Poa* and *Festuca* are frequent, but the dominant grass is a species of *Calamagrostis*. A fragrant grass, a species of *Hierochloa* called locally 'vanilla grass,' occurs, but it is not abundant. Other conspicuous plants are *Trientalis Europea arctica*, two species of violets, *Geranium erianthum*, also conspicuous in the fall from its red foliage, a yellow *Castilleja*, *Viburnum pauciflorum*, *Sanguisorba latifolia*, *Galium boreale* and a large showy *Lupinus*. The salmonberry, *Rubus spectabilis*, is frequent and bears a large, delicious, edible berry. In midsummer great patches of fireweed, *Chamaenerion angustifolium*, suddenly burst into bloom, giving a most striking color effect. Later in the season *Solidago lepida* becomes conspicuous. *Lathyrus palustris* was the only plant observed having a vine-like habit.

The peat bogs occur at the foot of the hills. Among their characteristic plants are *Betula glandulosa*, a shrub reaching two feet in height; *Empetrum nigrum*, with black fruits that are called 'blackberries' and are eaten by the natives, and *Ledum palustre*, the leaves of which are used for a tea. *Vaccinium ovalifolium* grows along the upper edge of the grass lands. It furnishes an important economic fruit.

The alpine flora on the rocky hills consists of a mat-like growth of mosses, *Cladonias*, *Empetrum*, dwarf blueberries, etc. The first to bloom in the spring is *Mærania alpina*. The fall foliage of this plant is very showy, forming intense red patches on the hillsides. Other

conspicuous plants are *Aragalus arctica*, *A. nigrescens*, *Chamaecistus procumbens*, *Drapensia Lapponica*, *Lloydia serotina*, *Campanula lasiocarpa*, *Arnica lassingi* and various dwarf arctic willows. *Vaccinium uliginosum* and *V. Vitis-Idæa* are abundant and their fruits are of great economic importance to the natives.

The paper brought out an interesting discussion lasting till the hour for adjournment.

F. S. EARLE,
Secretary.

RESEARCH CLUB OF THE UNIVERSITY OF MICHIGAN.

THE regular October meeting was held on the evening of the twenty-first. Dr. Raymond Pearl discussed the problem of the 'Relative Variability of Man and Woman,' and presented statistical evidence of two sorts, bearing on the subject. (1) It was shown that with respect to age at death from *fatal* congenital malformations woman was significantly more variable than man. The standard deviation in age at death for men was 2.104 years, while for women it was 2.699 years, giving a difference of .595 year with a probable error of $\pm .044$. The mean age at death was not significantly different in the two sexes. Since there is a positive correlation between (a) the degree or intensity of malformations sufficiently great to cause death, and (b) the age at which death occurs, it was maintained that these results give evidence as to the relative variability of the sexes with reference to the degree or intensity of fatal malformations, and indicate a slightly, but significantly, greater variation in the female.

(2) It was shown from an analysis of Marchand's data on human brain-weights that with reference to this character the female was slightly more variable than the male.

These results are in accordance with Pearson's main conclusion from a study of the relative variability of the sexes with respect to a large number of physical characters.

Professor E. D. Campbell read a paper on 'The Diffusion of Sulphides through Steel.'

Ten years ago the author had determined the diffusion of sulphide of iron through steel,

and later he found that to effect diffusion the sulphide must be an oxysulphide.

That steel should be permeable to liquids even when heated to 1,200° C. was considered so unlikely that Professor J. O. Arnold, of the University Technical College of Sheffield, England, repeated a portion of the work, and confirmed the results.

In September, 1902, H. Le Chatelier, of L'Ecole des Mines, Paris, with M. Ziegler published a paper in which they denied the permeability of iron, stating that the escape of the sulphide of iron was entirely by capillary action through the space between the steel plug and the sides of the hole containing the sulphide. Professor Campbell described a series of experiments in which the sulphide was contained in a long steel tube closed at one end with a tapered screw plug, and heated in such a way that it was impossible for sulphide to escape around the plug. When the steel tubes were heated above 1,200° C. a portion of the sulphide was found to have penetrated the solid walls of the steel tube, thus confirming the author's first contention, that steel when heated to about 1,200° C. is permeable to oxysulphide of iron without increase in the per cent. of sulphur in the steel.

The November meeting occurred on the eighteenth. Mr. G. O. Higley described 'A Method for Determining the Excretion of Carbon Dioxide from the Lungs.' The existing methods for measuring the amount of carbon dioxide in the expired air do not permit a study of the character of sudden changes such as occur at the beginning and at the end of vigorous muscular work, nor such changes as accompany the 'secondary rise' in the pulse rate as described by Bowen (memorial volume of contributions to medical research dedicated to Victor C. Vaughan, 1903). In Mr. Higley's method the expired air, after removal of moisture, is freed from carbon dioxide in an apparatus charged with soda lime, and suspended upon the arm of a balance. A long, light lever attached to the end of the beam greatly magnifies the movements of the beam, and writes the curve of carbon dioxide excretion upon the blackened paper of a kymograph drum. On the same drum may

be recorded the carotid pulse, the respiration, the time in seconds and the rate of muscular movements. Experiments made with this apparatus show that the curve of carbon dioxide excretion during work closely resembles that of the pulse, and that carbon dioxide is at least in part the cause of the secondary rise in the pulse rate observed by Bowen.

Dr. W. B. Pillsbury detailed some experiments on 'The Attention Wave as a Measure of Fatigue.' Not merely the daily rhythm of fatigue and practise of the typical morning and evening workers was reflected in the ratios of the period of visibility to the period of invisibility in the attention wave, but the degree of fatigue on days of severe work as compared with easy days had a corresponding variation in the fluctuation of attention. In the morning, practise shows itself in a continuous increase in efficiency through at least a considerable portion of the experiment; while in the evening there is a decreasing effectiveness almost from the beginning. As further substantiation of the theory that the attention wave is closely related to the Traube-Hering or Mayer vaso-motor waves, it was noted that both have the same daily rhythm of length.

FREDERICK C. NEWCOMBE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

MORGAN ON EVOLUTION AND ADAPTATION.

TO THE EDITOR OF SCIENCE: I have always supposed that what are generally called Lamarckian views of evolution were considered with less prejudice by biologists in the United States than in England or Europe, and that my own publications in support of such views were, therefore, likely to be known and read in America even if they were almost completely ignored by my own countrymen.

I find, however, that Dr. Thomas Hunt Morgan in his book 'Evolution and Adaptation,' which has just appeared, makes no mention whatever of my book 'Sexual Dimorphism in the Animal Kingdom, a Theory of the Origin of Secondary Sexual Characters,' which was published in London more than three years ago. Any biologist, American or other, has a perfect right to reject all my conclusions,

but it seems to me that an author who devotes a great part of his book to the discussion of Darwin's theory of sexual selection and the evolution of secondary sexual characters, in entire ignorance of the facts and arguments which it cost me years of labor to collect and elaborate, lays himself open to the charge of writing without proper knowledge of the literature of his subject. I have published the results of experimental work apart from this, but the only reference Dr. Morgan makes to it is to a popular article in *Natural Science*; he has not apparently consulted the original memoirs.

Like other English writers it has been my ambition that my work should be known to the scientific public of the United States, which is not only very intelligent but free from prejudices which are stronger than reason in England. I am much disappointed to find that my chief contribution to the investigation of evolution is so little known to American evolutionists.

J. T. CUNNINGHAM.

ZOOLOGICAL SOCIETY,

3 HANOVER SQUARE, LONDON, W.

MUTATION AND SELECTION.

IN reading Professor Morgan's very interesting and valuable book, 'Evolution and Adaptation,' it is surprising to find that he apparently regards the theory of evolution by selection and DeVries's mutation theory as being to a degree in conflict.

The evolution which observation shows us has taken place is chiefly characterized by the fact that it has brought organisms into favorable relation with their environmental conditions. That this could have been secured by mutation unaided by selection seems altogether unlikely.

In the case of the leaf butterflies of the genus *Kallima* the theory of evolution by mutation alone must assume that the remarkable resemblance arose all at once by a single mutation, or that there were a series of mutations which for some unaccountable reason were of such a character as to make the resemblance to a leaf gradually grow more perfect, though no selective action of the environment controlled this improvement in pattern.

The first assumption, of the origin of the perfect leaf pattern by a single mutation, is unsupported by evidence and to me seems very improbable. That the resemblance arose by the cumulation of a series of mutations independent of selection seems no less improbable, for in this case we have either to assume some mysterious internal regulation of the mutations directing them all in one direction, or else we must assume that among the many possible mutations only those that were in the direction of closer imitation happened to occur. The latter is of course practically impossible upon the theory of probabilities and the former leads us into a realm of darkness which we seem at present unable to explore. If, however, there is reason to believe in such internal directive influence, we are not justified in rejecting it because of our inability to study its nature and action. I can not see that we have such evidence.

I have been impressed with the feeling that Professor Morgan has allowed his opposition to Darwin's conception of evolution by the selection of favorable 'fluctuating variations' to cause him to understate the importance of selection, though in parts of his book he recognizes that selection acts on mutants and variants. The Darwinian theory and the theory of evolution by selection are not identical, yet Professor Morgan frequently refers to them as if they were so. If mutations be distinct from fluctuating variations, as our as yet very scanty evidence seems to suggest may be the case, still both mutations and variations, so far as we can see, would be subject to selection. The theory of selection is an explanation of some of the phenomena of adaptation. It is difficult to see that the mutation theory, apart from selection, aids us in understanding or imagining how this adaptation, the most general phenomenon in organisms, has been secured.

Mutation may be the mode of origin of certain useful qualities, but it is difficult to see how it explains their retention and perfection. The theory of selection makes no pretense to explain the origin of varieties or mutations. It attempts to explain the adaptation of organisms to their conditions of life,

such adaptation resulting from the selection of those individuals which vary or mutate in useful directions. The theory of selection begins where the theory of mutation leaves off.

Not even a combination of DeVries's mutation theory with Weismann's theory of germinal selection would give us, without natural selection, an explanation of progressive perfection of adaptation. We should still need to add Nägeli's, or rather St. George Mivart's, perfecting principle.

The work of DeVries seems especially valuable since it brings to the front such questions as the following:

Are there mutations which are distinct from fluctuating variations? Are fluctuating variations restricted to rather narrow limits, and are the larger variations which occur of a different sort, establishing a new mean about which a new series of fluctuating variations cluster?

Are mutations (or variations) definite or indefinite? Do they follow certain lines or do they occur in all directions?

If the direction of mutations (or variations) is wholly or in part predetermined, what are these predetermining factors? Are they internal (involved in the nature of the organism), or external (environmental), or both?

Is there a tendency in mutants (or variants) to revert toward the condition of the parent stock?

Are mutants (or variants) of one sort more (or less) fertile or more (or less) vigorous when bred together than when bred with the parent stock or with mutants (or variants) of another sort? Does mutation (or variation) cause partial (or complete) segregation?

Are hybrids between mutants (or variants) of different sorts or between mutants (or variants) and the parent stock intermediate in character between the two parents, or do they follow wholly or chiefly one parent? If the latter, which parent is followed in the several kinds of crosses?

Upon most of these points the observations of DeVries have an important bearing, though, without much further observation, they do not decide them.

It seems possible that one of the most im-

portant results of the work carried on by and stimulated by DeVries will be to show another way in which partial segregation may be secured, and the theory of natural selection needs all the help it can get from segregation.

It should hardly be necessary to urge that, in understanding the development of the conditions which prevail to-day among organisms, the problem of the origin of species seems of very secondary importance in comparison with the problem of the perfection of adaptation.

MAYNARD M. METCALF.

THE WOMAN'S COLLEGE OF BALTIMORE.

WILBUR WRIGHT'S SUCCESSFUL FLIGHT IN A MOTOR-DRIVEN AEROPLANE.

THE newspapers of December 18 contained the announcement that Wilbur Wright had flown a distance of three miles with an aeroplane propelled by a 16-horse power, four-cylinder, gasoline motor, the whole weighing more than 700 pounds. To the average newspaper reader this meant no more than similar statements previously made in the newspapers that men had flown in New York, or St. Louis, or San Francisco. But to the student of aeronautics, and particularly to those who had followed the careful scientific experiments with aeroplanes which were being made by Orville and Wilbur Wright, it meant an epoch in the progress of invention and achievement, perhaps as great as that when Stevenson first drove a locomotive along a railroad.

It meant that after ages of endeavor man had at last been able to support himself in the air as does a bird and to land in safety at a spot chosen in advance.

The report from an authoritative source confirms the fact of this flight, but modifies the details somewhat from those given in the newspapers. It appears that four successful flights were made in a motor-driven aeroplane on December 17 near Kitty Hawk, N. C. The wind was blowing about 21 miles an hour and a speed relative to the wind of 31 miles an hour was attained by the aeroplane. This meant a speed of 10 miles an hour relative to the ground. The aeroplane had a surface of 510 square feet and in the longest flight was in the air 57 seconds. The aeroplane

is said to have risen from a level. The reported distance of three miles was probably relative to the wind.

The earlier work of the Wright brothers is described in the reports of the Western Society of Engineers and in part republished in the Annual Report of the Smithsonian Institution for 1902. Their invention of a forward rudder has contributed to the final success.

The modern success in aeronautics may be said, I think, to date from the feat of Otto Lilienthal in 1891 in gliding down an incline in an aeroplane. These glides were repeated with much success and with an improvised aeroplane by Mr. Chanute and Mr. Herring in our own country. Mr. Herring even went so far as to carry with him 50 pounds of sand in his aeroplane which weight he computed would be that of an engine sufficient to support him.

Mr. Pilcher, in England, repeated these experiments on a level by rising into the air in his machine when drawn by a horse attached to a rope, the machine rising like a kite and then gliding forward. Mr. Whitehead is described in the *Scientific American* as having repeated this experiment recently in Connecticut with a motor on board the aeroplane.

In the meantime, in 1896, Dr. Langley had driven a model weighing about 25 pounds through the air with a small steam-engine, and Sir Hiram Maxim had performed the wonderful feat of lifting 7,000 pounds into the air for a moment. This was done with an aeroplane having 5,000 square feet of surface driven by serial screws attached to a steam-engine of 360 horse-power and of extraordinary lightness.

But, notwithstanding all these partial successes, there was, owing to the recently reported failure of Dr. Langley to lift a man and to other causes, a wide skepticism as to the possibility of human flight.

Mr. Wright's success in rising and landing safely with a motor-driven aeroplane is a crowning achievement showing the possibility of human flight. Much yet remains to be done, but with the stimulus of this beginning progress will probably be rapid. In the progress now achieved a great deal is due to Mr.

Octave Chanute, an eminent American engineer, whose enthusiasm and great knowledge have stimulated the work of Herring, Hufaker, the Wrights and many others, and whose advice and supervision was freely given in perfecting the machine which has finally succeeded.

H. H. CLAYTON.

THE EDITORIAL COMMITTEE OF SCIENCE.

At the recent meeting of the American Association for the Advancement of Science, the council resolved to add the vice-presidents of the association and the permanent secretary to the editorial committee of SCIENCE. The vice-presidents of the association, each of whom is chairman of one of the ten sections, represent the sciences covered by the journal, and are always among the most efficient and active men of science of the country. Their cooperation during their term of office will greatly promote the interests of the association and of the journal. We also hope to secure the cooperation of several other men of science in order that all branches of science and all parts of the country may be adequately represented. The members of the committee who have had control of the journal during the nine years of the new series will of course remain as heretofore. SCIENCE is now so well established as the representative organ of American men of science that it seems unnecessary to print each week the names of the editorial committee and of the responsible editor.

SCIENTIFIC NOTES AND NEWS.

We hope to publish next week the official report of the St. Louis meeting of the American Association for the Advancement of Science, and as soon as possible the reports of the societies meeting in affiliation with it and of the other societies that met during convocation week at Philadelphia and elsewhere. Professor Farlow, of Harvard University, the eminent botanist, was elected president of the association, and vice-presidents were elected as follows: Professor Alexander Ziwet, of the University of Michigan, Section of Mathe-

matics and Astronomy; Professor W. F. Magie, Princeton University, Section of Physics; Professor C. P. Kinnicutt, Worcester Polytechnic Institute, Section of Chemistry; Professor D. S. Jacobus, Stevens Institute of Technology, Section of Mechanical Science and Engineering; Professor E. A. Smith, University of Alabama, Section of Geology and Geography; Dr. C. Hart Merriam, U. S. Biological Survey, Section of Zoology; Professor B. L. Robinson, Harvard University, Section of Botany; Dr. Walter Hough, U. S. National Museum, Section of Anthropology; Martin A. Knapp, Interstate Commission of Commerce, Section of Social and Economic Science. President C. S. Howe, Case School of Applied Science, was elected secretary of the council, and Professor C. A. Waldo, Purdue University, general secretary. The association will meet next year at Philadelphia and the following year at New Orleans.

THE American Society of Naturalists at the annual meeting in St. Louis last week elected officers as follows: *President*, E. L. Mark, Harvard University; *vice-president for the Eastern Section*, Franklin P. Mall, the Johns Hopkins University; *vice-president for the Central Section*, John M. Coulter, of the University of Chicago; *secretary*, Chas. B. Davenport, University of Chicago; *treasurer*, Hermann von Schrenk, Missouri Botanical Garden and the Bureau of Forestry; *additional members of the executive committee*, Professor J. McKeen Cattell, Columbia University, and Professor William Trelease, Missouri Botanical Garden. The program of the Naturalists at St. Louis was similar to that of recent years. On Tuesday evening President David Starr Jordan, Stanford University, gave an illustrated lecture on 'The Resources of the Sea,' which was followed by a smoker at the University Club. On Wednesday afternoon the annual discussion was held, the subject being 'What kind of degrees should be conferred for scientific work?' the opening speakers being President Jordan, President Van Hise, Professor Cattell and Professor Coulter. The annual dinner was held on Tuesday evening at the Mercantile Club, and was followed by the address of the presi-

dent, Director William Trelease, of the Missouri Botanical Garden, whose subject was 'Critical Periods in the Life of a Naturalist.' We hope to publish subsequently this address and the discussion.

At the annual meeting of the Geological Society of America at St. Louis, Professor H. L. Fairchild, University of Rochester, was elected president; Professor J. C. Branner, Stanford University, secretary, and Professor I. C. White, University of West Virginia, treasurer.

At the twelfth annual meeting of the American Psychological Association held at St. Louis last week, Professor William James was elected president. This is the only occasion on which a past president has been reelected president of the association. Professor Livingston Farrand, Columbia University, will continue as secretary, and the members of the executive committee elected to succeed the retiring members, Professor John Dewey, of the University of Chicago, and Professor J. Mark Baldwin, of the Johns Hopkins University, were Professor Hugo Münsterberg, of Harvard University, and Dr. Henry Rutgers Marshall, of New York City.

At the third annual meeting of the American Philosophical Association, held at Princeton on December 29, 30 and 31, Professor G. T. Ladd, of Yale University, was elected president; Professor Frank Thilly, of the University of Missouri, vice-president, and Professor H. N. Gardiner, of Smith College, secretary-treasurer. The new members of the executive committee are Professor James H. Tufts, University of Chicago, and Professor H. Heath Bawden, Vassar College.

OFFICERS of the New York Academy of Sciences have been elected as follows: *President*, Edmund B. Wilson. *Vice-presidents*: Section of Geology and Mineralogy, James F. Kemp; Section of Biology, L. M. Underwood; Section of Astronomy, Physics and Chemistry, Chas. Lane Poor; Section of Anthropology and Psychology, F. J. E. Woodbridge. *Corresponding secretary*, Richard E. Dodge. *Recording secretary*, Henry E. Crampton. *Treasurer*, Charles F. Cox. *Librarian*, Ralph W.

Tower. *Editor*, Chas. Lane Poor. *Councilors* (to serve three years), Livingston Farrand, E. O. Hovey. *Finance committee*, John H. Hinton, C. A. Post, Henry F. Osborn.

It is announced that Mr. John Morley will deliver the principal address at the opening of the Technical Institution, founded at Pittsburgh by Mr. Carnegie, in the autumn of 1904.

OXFORD UNIVERSITY has conferred the degree of D.C.L. on Mr. Henry Wilde, F.R.S., inventor of the dynamo electric machine. Mr. Wilde is the founder of the Wilde Readership in Mental Philosophy and of the John Locke scholarship on the same subject.

THE large gold medal for services rendered to art and science has been awarded by the German government to Professor Paul Ehrlich, director of the Imperial Institute of Experimental Therapeutics at Frankfurt.

MR. REGINALD INNES POCOCK, F.Z.S., assistant at the Natural History Museum, South Kensington, has been appointed resident superintendent of the Gardens of the London Zoological Society. Mr. Pocock entered on his duties on January 1, 1904.

THE United States Archeological and Ethnological Commission met at the State Department on December 21. Dr. W. J. McGee, the anthropologist of the Louisiana Purchase Exposition, is chairman of the commission. The other members are Mr. Volney W. Foster, of Chicago, and Professor Francis B. Kelsey, professor of Latin language and literature, the University of Michigan.

MR. GURDON TRUMBULL, the well-known artist and ornithologist, died in Hartford, Conn., on December 28, in the sixty-third year of his age.

A FIRE, on December 27, in the building in Washington occupied by the U. S. Geological Survey caused a loss estimated at \$15,000, including the destruction of some valuable maps and records.

THE *Matin* announces that it has placed the sum of 30,000*f.* at the disposal of Professor d'Arsonval in order to enable him to continue his researches in connection with the properties of radium.

THE U. S. Geological Survey will make an exhibit at the Louisiana Purchase Exposition in St. Louis which will illustrate the survey's methods of work and the products of its various branches as completely as the space placed at its disposal will permit. Small pamphlets containing descriptions of the methods of work pursued by the different branches, divisions, and sections of the survey will be published for distribution during the exposition.

SECRETARY CORTELYOU has recommended the establishment at Washington under the Bureau of Fisheries of an aquarium that shall surpass in importance any similar institution.

REUTER'S AGENCY is informed that a scientific expedition, which has been organized by the anthropological section of the St. Louis Exhibition, is about to leave England for Central Africa under the direction of Mr. S. P. Verner, who landed a few days ago from New York. Since his arrival in England Mr. Verner has been to Brussels to consult with the authorities there regarding his expedition. With reference to his journey Mr. Verner says: "In order to get at the aboriginal life as little changed as possible by the inroads of civilization it is desired to go entirely out of the track of previous explorers, as well as of all settlers, and to enter the most untouched region to which access can be obtained. One of these regions is that between the Congo and Zambesi valleys, to the north of Livingstone's and the south of Stanley's journeys. This territory embraces, among others, the vast Lunda Plateau. It is into this and contiguous territories that the expedition is proceeding. The region is 1,500 miles from the West Coast. The fact that the enterprise leads into a country of cannibals and savages, and that the attainment of our object requires diplomacy and tact in dealing with the natives, makes the mission one of difficulty and hazard. The time at its disposal also will make it, if successful, a notable exploit. To secure permission and cooperation of the European governments controlling the territories in question representations are being made by the government of the United States. Our base of operations will be from the capital of Chief

Ndombe, paramount chieftain of the Lunda tribes, at the head of navigation of the Kassai river, the largest southern tributary of the Congo, from which place an effort will be made to penetrate the interior. Ndombe is one of the most remarkable of living African rulers. He is peculiar for being of a bright copper color, as are his family, although there has been no known white blood in his ancestry. He is also a firm friend of the white man, having signified his assent to white suzerainty over his domain, and having instructed his people to recognize the authority of the foreigners. His general jurisdiction is very extensive, and, including federated and associated tribes, may be said to include several million people over a territory of several hundred thousand square miles. His own immediate family and their blood relations are known as the Bakwampesh, a word almost exactly equivalent to 'aristocracy.' In his territory are tribes of pygmies, of cannibals, and the last remnant of the once powerful transcontinental slave-traders, the Bimbadi. The scientific interest attaching to this expedition arises from the fact that it has lately become strongly suspected that the most primitive forms of the human race are to be found in remote Africa, the oldest region known where the native life has been longest undisturbed by outside influences. It is desirable to record the conditions now existent there and to obtain specimens of the arts and products of the people before they have changed their aboriginal ways for the innovations of rapidly approaching civilization."

MR. ERNEST ALYSCOGHE FLOYER, inspector-general of Egyptian telegraphs, died at Cairo on December 1 from heart disease, at the age of fifty-one years. We learn from the *London Times* that Mr. Floyer was educated at the Charterhouse, receiving in 1869 an appointment in the Indian Telegraph Service. In 1876 he received his first long leave, and started, unaided and alone, for the unexplored interior of Baluchistan. His observations and surveys on this difficult and dangerous journey were of considerable geographical interest. He returned to London in the same year, and sub-

sequently published an account of his travels in a work entitled 'Unexplored Baluchistan.' In the same year (1876) he was appointed inspector-general of Egyptian telegraphs. In 1887 he surveyed, and described in the 'Proceedings of the Royal Geographical Society,' 'Two Routes in the Eastern Desert of Egypt,' and later described the results of an expedition to the same desert in an official publication entitled 'Etude sur la Nord-Etbai.' It was during this journey that he rediscovered the ancient emerald mines of the Egyptians, and his maps and observations have been the basis for the subsequent exploitation of minerals in this region. During the last decade Mr. Floyer devoted much attention to the reclamation, by judicious planting, of the land which had been lost to cultivation by the encroachment of drifting sand upon the western border of the Delta.

It is proposed to establish under the auspices of the International Sanitary Conference an international sanitary bureau for the collection of information respecting infectious diseases, such as plague, cholera and yellow fever, and also for the harmonious working of those sanitary regulations in the east which have so greatly contributed within the last five years to the preservation of public health, as well as to the benefit of trade, by the suppression of the old quarantine system. If the movement is successful the bureau will have its headquarters in Paris.

UNIVERSITY AND EDUCATIONAL NEWS.

THE will of the late Washington Corrington, of Peoria, Ill., leaves the entire estate, valued at \$750,000, for the founding of an educational institution to be known as Corrington Institute and University. The estate is to be managed by trustees until it reaches \$1,500,000, when work is to be begun at Mr. Corrington's late home, just outside the limits of Peoria. Professor John M. Coulter, of the University of Chicago, is one of the trustees.

By the will of the late Ruth A. Hoar, the Worcester Polytechnic Institute receives \$5,-

000 and Clark University will ultimately receive \$30,000.

PALMER UNIVERSITY, at Muncie, Ind., has secured the \$100,000 necessary to obtain the endowment of \$100,000 left by the late F. A. Palmer.

DR. EDWARD HITCHCOCK, JR., for several years professor of physical culture and hygiene and director of the gymnasium at Cornell University, has resigned.

PROFESSOR W. A. S. HEWINS, M.A., having resigned the post of director of the London School of Economics and Political Science, the senate has appointed in his place Mr. H. J. Mackinder, M.A., lecturer in economic geography at that institution. Mr. Mackinder has lately resigned the principalship of University College, Reading, but will continue his lectures on economic geography in the University of London and historical geography in the University of Oxford.

MR. WILLIAM RAVENSCROFT HUGHES, B.A., has been elected to a fellowship in Jesus College, Cambridge University. Mr. Hughes was fifth wrangler in the mathematical tripos, 1902.

THE council of King's College, London, has appointed to the chair of mathematics Mr. S. A. F. White, M.A., of Wadham College, Oxford, who has been demonstrator in natural philosophy in King's College since 1895. The council has also appointed Mr. E. F. Herroun assistant professor of physics, and Mr. J. B. Dale, M.A., of St. John's College, Cambridge, assistant professor of mathematics.

SIR JOHN SCOTT BURDON-SANDERSON, M.A., D.M., hon. fellow of Magdalen, and Regius professor of medicine at Oxford University, has placed his resignation of the professorship in the hands of the vice-chancellor. Sir John Burdon-Sanderson was appointed to the regius professorship, to which is annexed the Aldrichian professorship of the practise of medicine, in 1895, upon the resignation of the late Sir Henry Acland, who had occupied the chair for thirty-eight years. Professor Burdon-Sanderson was the first occupant of the Waynflete chair of physiology, to which he was appointed in 1883, his successor being the present professor, Dr. Gotch.